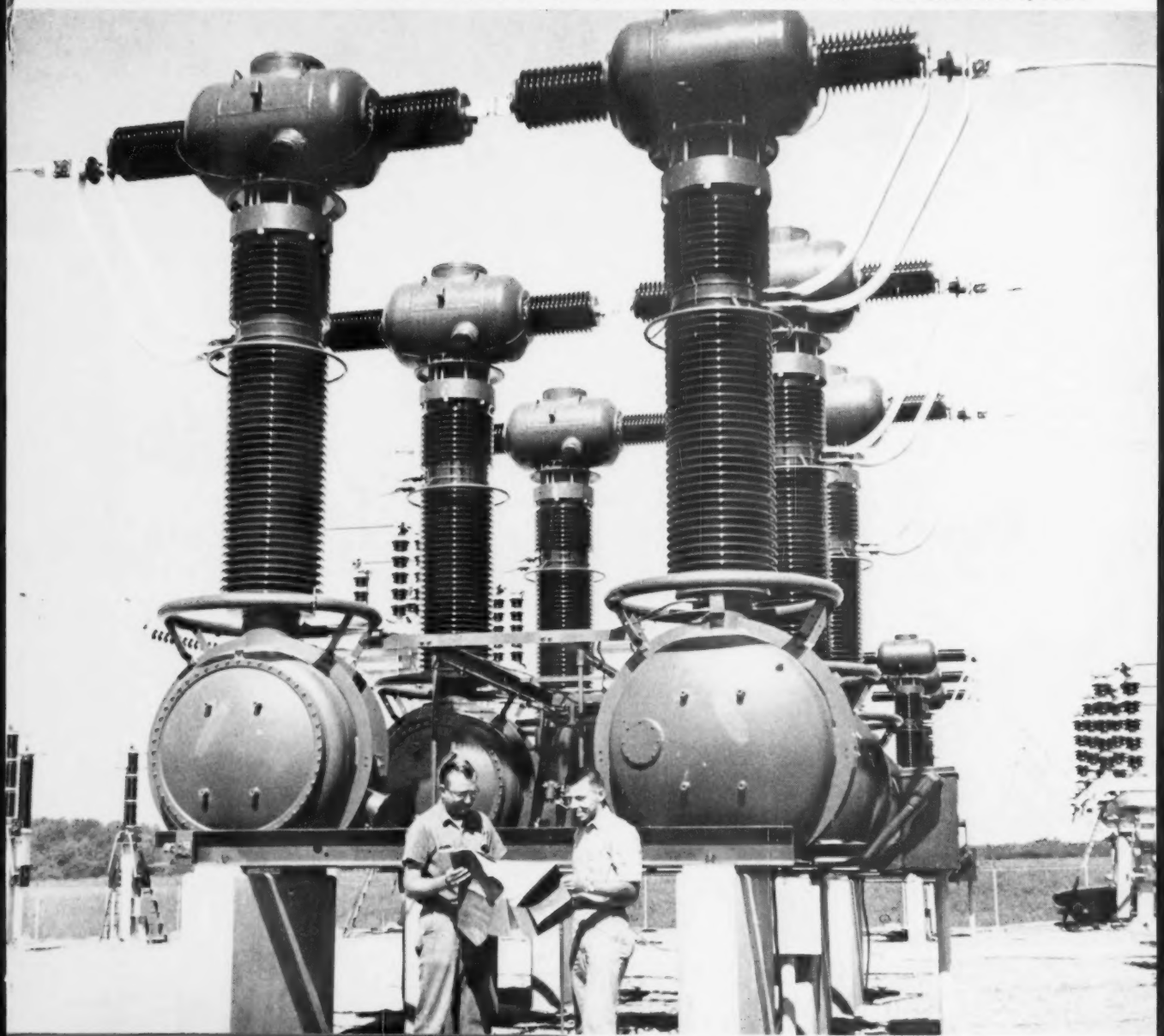
IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication DECEMBER 14, 1961



★ As Nation's Power Network Spreads—

Metalworking Shares In A $4 Billion Market p. 81

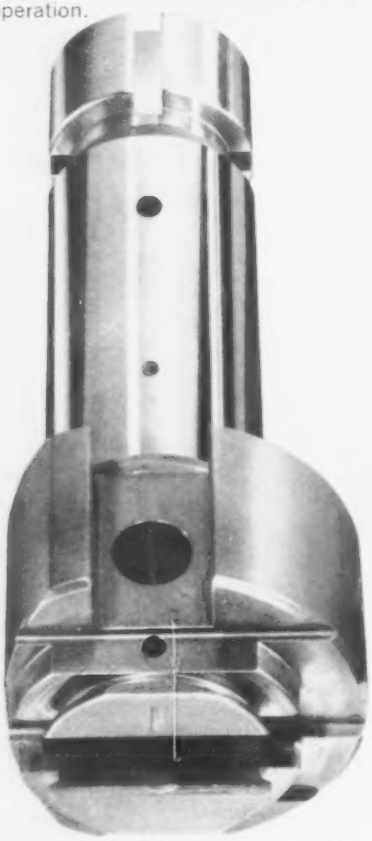
Steel Stocks Start to Grow p. 84

Advances in Working Beryllium p. 111

Digest of the Week p. 2-3

if you can't tolerate seizing and galling

NITRALLOY (leaded*) is a special hard-surfaced alloy now used by Hartford Machine Screw Company, Division of Standard Screw Company, for distributor rotors in Roosamaster fuel injection pumps. It possesses exceptional wear resistance, dimensional stability, and—most important for close tolerance moving parts—a minimum tendency to seize and gall in operation.



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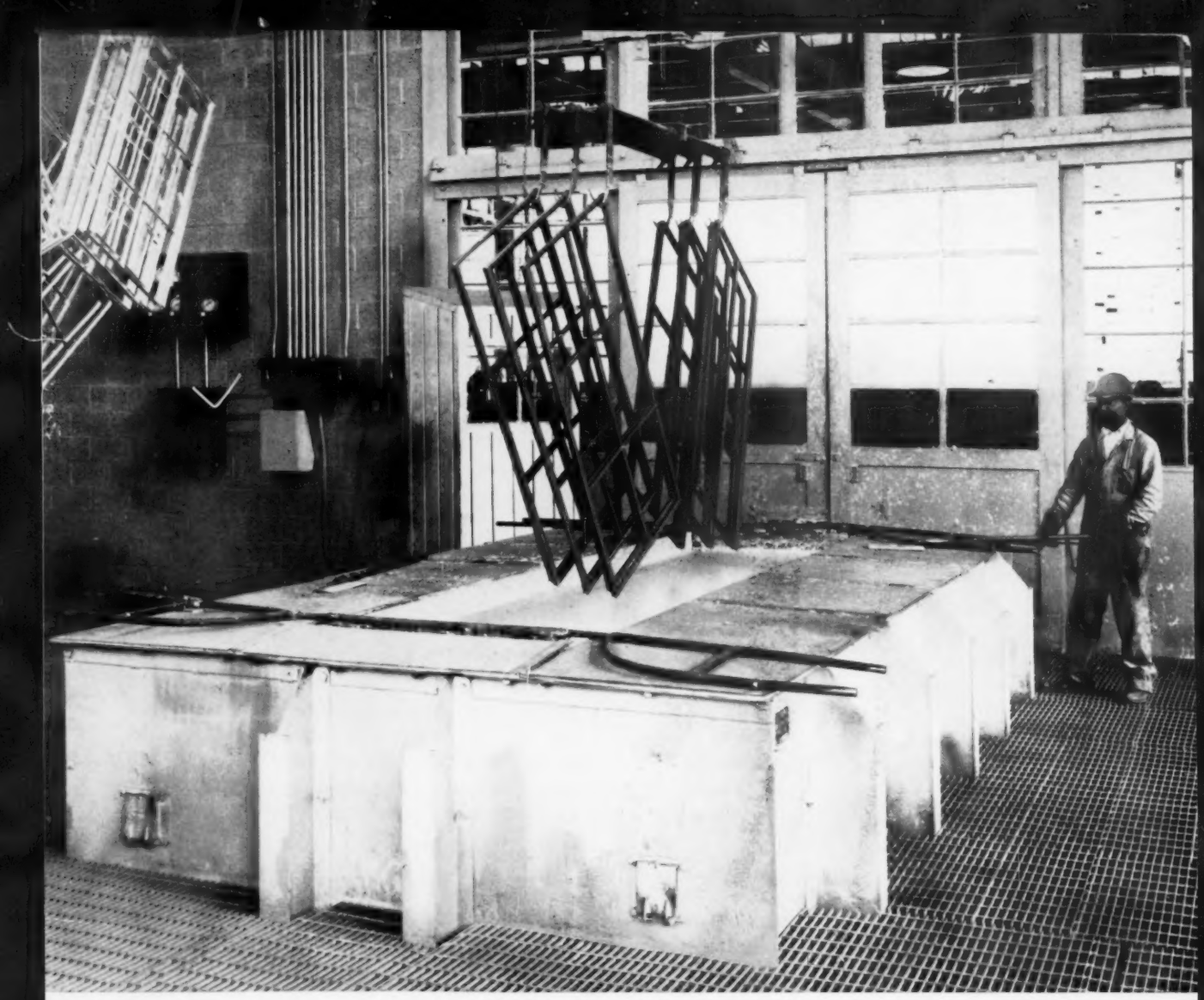

Rugged strength is built into these steel windows by the skillful design of the special rolled steel bar section. Here, in a steel fabricator's shop, they get a "beauty bath" of gleaming zinc to give them long life and eye appeal.

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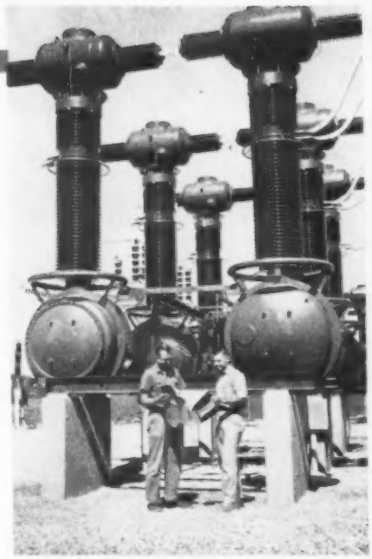


Electric Power: A Giant Grows

Electric power has come of age. While many still await the predicted surge of the Soaring Sixties, the electric power field is already expanding at a high-voltage rate. Electric power's growth also spells good news for metalworking. This week's Special Report tells the full story. p. 81

—Phila. Electric Co. photo.

How Fast Are Steel Stocks Building?

One leading commercial analyst says the buildup will be orderly, at least through January. This is in contrast to conventional market analysis which indicates a fast and furious rate of new orders for steel in January. p. 84

Forming Advances Spur Beryllium Use

Progress has been made in beryllium fabrication technology. The latest practices were reported at the Beryllium Metallurgy Conference, held at New York University last week. These forming advances allow new shapes and improved properties. p. 111

Next Week

Treasury Secretary Dillon on Taxes

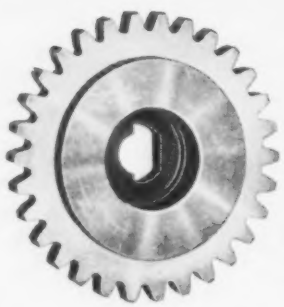
In an exclusive Iron Age interview, Treasury Secretary Douglas Dillon tells of the Administration's plans for revising business taxes in 1962. He discusses depreciation schedules, investment credits, foreign income and chances for overall tax reform.

REPORTS ON RYCUT

world's fastest machining alloy steels in their carbon ranges

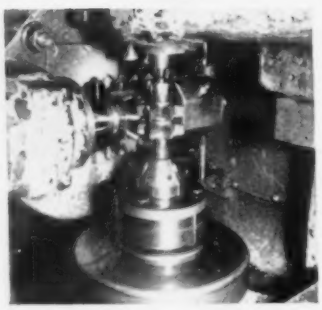
CUTS PRODUCTION COST 50% for Flodar Corp.

This manufacturer of high pressure hydraulic tube and pipe fittings reports production cost savings of 50% after switching from 4150 to Rycut® 50 and from 4140 to Rycut 40. In addition to higher production, Rycut machined to a better finish, held size perfectly and eliminated scrap loss. (With 4140 and 4150 scrap loss ran up to 30%.) And tool life, from 1 to 3 hours with the standard alloys, was boosted to 8 hours with Rycut.



MACHINES 85% FASTER for American Bosch

Rycut 40 was selected by American Bosch for this plunger drive gear for a diesel injection pump because it machines 35% faster than 4140—keeping machining costs at a minimum without sacrifice of mechanical properties. The company also found that Rycut 40 produced a better finish than 4140 and reduced down time by lengthening tool life.



BOOSTS SPROCKET PRODUCTION for McCulloch Corp.

These are the results obtained at McCulloch Corporation when they switched from non-leaded alloy to Rycut 20 for chain saw sprockets. Turning, forming, reaming and drilling operations: hourly production rate raised from 68 to 100 pieces—tool life lengthened from 3½ to 5 hours. Hobbing machine operations: hourly production raised from 43 to 65 pieces—tool life lengthened from 3916 parts per tool to 5874.

Rycut is available in a wide range of analyses: Rycut 20 is a case carburizing, oil hardening steel, with balanced composition. Rycut 40 annealed attains greatly varied strength and toughness, depending on heat treatment, making it suitable for an unusually wide range of applications. Rycut 50 annealed may be preferred (to Rycut 40) for parts with large mass or applications requiring higher mechanical properties. Rycut Heat Treated, stress relieved, assures uniform properties and machinability—carbon content is matched to bar size. Call Ryerson for any alloy requirement—and get top technical help, too.

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Free Bargaining: Let Government Stay Out!

It won't be long now before the drums will be beating for the steel labor struggle. Already we hear from many quarters that "Mr. Kennedy won't allow a strike."

Such a frame of mind suggests that the government is running the steel labor hassle. It also suggests that labor will keep trying for a big fat package in hopes the government will force a settlement.

The union has every reason to expect the government to step in. On almost every occasion in the past, it did. And always the steel industry was the fall-guy.

Last time there was a forced settlement. In 1956 there was a forced settlement. But after the 1956 fracas, steelmakers recovered some of the wage-cost boost by raising prices. In the last package deal—1960—there were no steel price increases to compensate for increased labor costs. In fact, prices were driven down on many items by competition, recession, and foreign competition. The last hike was in 1958.

The union has argued the steel companies need no price increase. But it is clear from an earnings standpoint that the industry is well down the line of industries making a fair return. And this year the industry will slip a few more notches. There appears to be no chance that prices will be advanced.

West Germany, Belgium, Great Britain, and Japan are not in the big business upswing they were in a year ago. That is usually the signal for lower prices on imported steel; it has started already and may get worse before long. That is a hurdle that is difficult for American steel companies to overcome. Most steel made abroad is produced in modern-designed furnaces and equipment.

Why should the rumor — or fact — that Mr. Kennedy will step in to prevent a long steel strike be going around now? As long as the union thinks he will step in, no real effort will be made to reach a reasonable agreement. As long as steel companies feel that they will get it in the neck again, how can they expect real collective bargaining?

The government should stay out of the picture and let the two giants swing, negotiate, and test each other, always hoping, of course, that the union will know a new day has come in which continual increases in wage costs can't help but injure the industry and itself.

Tom Campbell

Editor-in-Chief

WHAT FEATHERS ARE TO A

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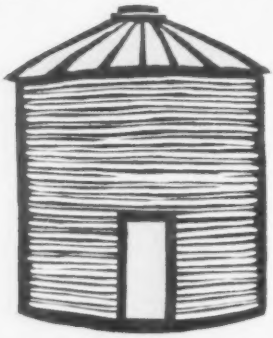
IS TO A



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Prices Face New Influence

Probably nothing is more puzzling about the present recovery than the behavior of prices. In the past, as recovery periods took hold, prices almost always started up with a firmness matching the business pickup. This isn't happening now.

Here's a look at a cross section of the economy since the cyclical trough in January: GNP, up 6 pct; industrial production, up 11 pct; plant spending, up 6 pct; construction spending, up 5 pct; retail sales up 4.5 pct; manufacturers' sales, up 8 pct.

But wholesale prices have dropped 1.2 pct. And consumer prices have gone up only a fraction of 1 pct.

Over-capacity and White House pressures may be some of the reasons behind the price lag. But over-capacity disappears only during a peak prosperity or in war-time. And little or no White House pressures have been exerted on retail and wholesale prices.

Any hunt for an explanation turns to the new magnitude and impact of world trade. Example: Recent boosts in interest rates that U. S. business must pay on loans were due to efforts to lessen flight of capital overseas.

And current price softness in scrap steel, copper, lead and zinc is largely due to foreign causes.

Forecast: More foreign pressures on prices as the European and Japanese booms slow down. Then their big new industrial machines will hunt for new markets.

Cash Flow Takes on New Role

Cash flow is more than a fresh Wall Street fad. Economist and consultant Lionel D. Edie finds it the real clue to capital spending.

In a recent study, Mr. Edie traced industry profits and depreciation from 1949 through 1960. He found that profits have fallen from 52 pct of cash flow to 22 pct. Depreciation has climbed from 48 pct to 78 pct.

As a result of comparing cash flow and capital expenditures for these same years, he sums up: "Practically every penny that is generated in cash flow finds its way into capital expenditures."

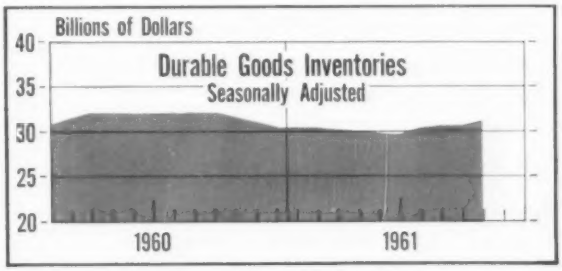
His point: To boost capital spending, faster writeoffs and shorter allowable asset lives are the most needed help to U. S. industry.

Durable Goods Stocks Rise

Durable goods inventories rose in October for the fourth straight month. Seasonally adjusted stocks for the month were valued at $31.3 billion, up $200 million from September.

The October inventory rise, while not quite as hefty as the September rise, was broader. Most of the component industries raised their stocks. And the buildup was led by the steel and machinery industries.

The stock-sales ratio in October was 2.05. This is



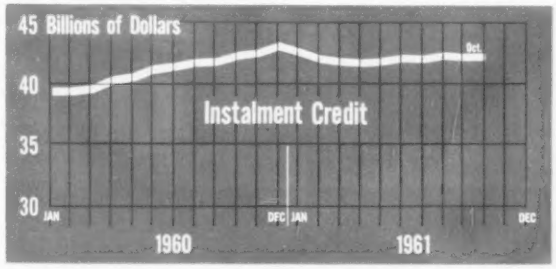
about the same as for August and September. And in view of rising sales this ratio indicates that further inventory buildup is in order.

Consumers Take On More Debt

One of the best signs of the new buying attitude of consumers is an October rise in instalment credit. Outstanding instalment debt rose to $42.7 billion in the month, up $184 million over September.

The credit expansion in October is the largest for any month since November 1960.

With auto sales booming, further gains are due.



Auto credit accounted for $69 million of the October expanded instalment credit.

Durables Cyclical Trend Shifts

Durable goods makers may be in for tougher cyclical bumps if the history of the last two recessions is repeated. A recent Commerce Dept. analysis shows that in the 1960-61 recession, durable goods consumption dropped 10 pct from peak to trough. In the 1957-58 recession, the drop was 10.8 pct.

This compares with drops of 3 pct in the 1948-49 recession and 7.1 pct in the 1953-54 setback. Nondurable goods and services show less severe drops.

No consistent pattern is shown for the snap-back of durable goods consumption after a low is hit.

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KINATROL couplings are compact, field proven and dependable. General Electric has had a good deal of experience in the engineering, manufacturing, and application of packaged adjustable-speed drives. And we know how important service is to a customer.

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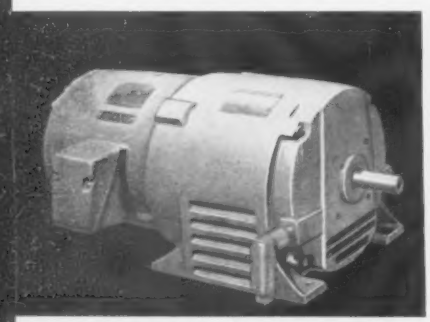

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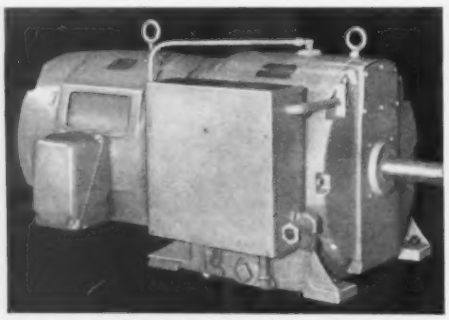
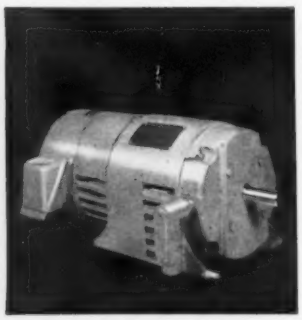


WATER COOLED, 25 to 150 HP



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No Steel Strike Talk: On What Basis?

In the past few weeks, there has been a groundswell of "informed" opinion that there will not be a steel strike. But the realists are not taking this seriously.

This doesn't mean there couldn't be a change. But there is no indication of it now, nor of any spadework being done to bring about a different basis of negotiations.

This buildup of "no strike" sentiment has its roots in the fact that the Secretary of Labor is the former counsel for the United Steelworkers. The conclusion: If President Kennedy does not want a strike, Arthur Goldberg will see to it that there is no strike.

But this line of reasoning neglects these facts: The attitudes of the keymen of both sides has not changed since the 1959 strike. The steel price situation is not fluid. This means that the steel companies can not grant a costly package and pass it on in higher prices.

The demand for security by the rank and file is growing. This could put Steelworkers President David McDonald in the same tight spot he was in, in 1959; he could not yield on certain points and hold his job.

On the other hand, the steel men are not ready to give up. They will fight until they are "processed" by the White House.

UAW: Foundries Hit

Ten Detroit area foundries were shut last week by the first strike to be called against them by the UAW in 20 years. All firms are members of the Gray Iron Founders Assn.

Some 600 employes of the companies walked out the morning of Dec. 4 in a dispute over wages. The workers belong to UAW Local 835.

An association source says the union is seeking wage hikes of from 8 to 10 cents an hour, while the companies are offering 5 cents.

More Profit Sharing

Reports persist that at least one more automaker is taking a close look at the possibilities of profit sharing plans as an incentive offering.

Profit sharing, up to now taboo in the auto industry, is being given a highly-publicized try by American Motors and the UAW. Most automakers have indicated firmly they are not interested.

Is It AFL vs. CIO?

What is the long-term future of the AFL-CIO? It's hard to tell whether this strife-torn labor giant will be able to keep moving in one direction.

This was the principal question asked last week as the union met at Miami Beach. And, if not a showdown, a clash between AFL-CIO president and dissenter Walter Reuther appeared imminent.

The merger of the crafts unions (AFL) and the industrial unions, (CIO) has never been strong. The two factions approach the entire subject of unionism in a different way. Internal squabbles and raiding have been characteristic of the six-year-old merger.

And lurking on the outside are James Hoffa and the Teamsters. Mr. Meany would take back the Teamsters, without Mr. Hoffa. Others, possibly from awe of the Teamsters size and authority, do not have such an active dislike for the Teamsters, with or without Mr. Hoffa.

It's a discouraging fact to Mr. Meany, however, that the federation of the two unions has not met with success; unless just holding together for that length of time is some measure of success.

LABOR FACES: Walter P. Reuther, UAW president, right, with William Hayes, president of Machinists Union.

Membership has slipped and union men know it. Some unions have lost for the reason that the number of jobs has dropped. Organization of white-collar people has not been a success. The unions have not made inroads in the South where much had been hoped for a few years ago.

Mr. Reuther and Mr. Meany have become increasingly cool to each other personally and to each other's philosophy.

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Every National oil seal is now phosphate coated to inhibit rust

Other oil seals are still shiny. But look what National gives you in place of the gleam: an exclusive phosphate coating that improves rust resistance by "holding" rust-preventing lubricants to the seal's metal surfaces. The result is superior rust resistance on the shelf . . . *and on the shaft* where condensation is a constant peril to seal life.

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Phosphate coating is just one of the "extras" in National seals. And with National you choose from a complete line with both Syntech rubber and Micro-Torc® leather seals in practically every type and size. When you need seals . . get the best. Call your National Seal Distributor.

NATIONAL OIL SEALS

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★ Depreciation Reform Coming

The Kennedy Administration is proving it means business about depreciation reform. And major metalworking industries will be among the first to benefit.

By the end of next month the Internal Revenue Service will complete industry studies which will lead to revised depreciation schedules. The revised schedules will be announced in the spring.

The U. S. Treasury Dept.'s view of depreciations schedules will begin with these industries: steel mills; metalworking machinery and machine tools; aircraft and parts manufacturers; automobile manufacturers; and electrical machinery and equipment manufacturers.

IRS tax experts will examine the useful lives of major types of machinery and equipment in the industries. These reviews will be followed by studies of schedule revisions for all U. S. industries. In most cases the revisions will mean faster tax write-offs.

Present depreciation schedules have been in effect since 1942. The out-dated schedules have been under heavy fire from industry.

A broad study of depreciation has been underway since the last months of the Eisenhower Administration. Reform promises were made then, but industry didn't believe them. The Kennedy Administration picked up the depreciation reform ball and now has quieted the doubters. The big move came in October when the White House announced a 40 pct speed-up in depreciation for the textile industry. Similar speed ups for the industries now being studied will be announced in the April-May-June quarter of 1962.

Treasury officials said the IRS studies would deal with the prospects for future technological advances. The Treasury's own studies of depreciation have dealt with past and present experience.

In the future, the officials add, studies of this nature "will be a continuous part of the process of keeping the depreciation schedules as realistic as possible in the light of technological change."

The Administration believes faster depreciation will stimulate investment in new machinery and equipment and, therefore, stimulate the U. S. economy.

In the new survey of the six industries the IRS is being assisted by about 50 companies and trade associations.

■ New Patent Policy Hearings Considered

Sen. John L. McClellan, D., Ark., is considering holding new hearings on government patent policy.

The hearings would wrap up testimony on bills before McClellan's Senate Patents Subcommittee. The bills would deprive industry of rights to inventions growing out of government contracts.

Sources close to the senator say he hopes his committee will report out a patents bill in the next session. They say more hearings have not yet been set, but may be in the near future. The subcommittee has already held extensive hearings on the patent bills.

Companies stand to lose all rights to inventions developed under government research contracts if Sen. McClellan has his way. The senator supports a bill giving the government title to these patents, without exception.

■ Free Trade Policy In Free Wheeling Fight

A preview of the coming Congressional battle over President Kennedy's new free trade proposals is taking place in Washington. The preview, with combatants firing away even before the battle officially starts, is showing in Senate-House Economic Subcommittee hearings.

Rep. Hale Boggs, D., La., chairman of the joint subcommittee studying trade policy, is proving that he will take a leading role in supporting President Kennedy's plans. He say it will be a waste of time for Congress to vote a mere extension of the present reciprocal trade act.

But another Committee member, Sen. Prescott Bush, R., Conn., predicts the President's program will raise so many issues that Congress will be unable to deal with all of them next year. He predicts Congress will just extend the present trade act.

The Senator's basic disagreement is indicative of the fate that awaits the President's proposals when Congress opens next month.

■ Price-Fixing Charge In Brazing Alloys

Five manufacturers of industrial brazing alloys and eight of their officers have been charged with price-fixing and boycotting distributors who refused to go along with them.

Atty. Gen. Robert Kennedy said the firms, charged with violating the Sherman Antitrust Law, accounted for about 92 pct of $16 million in sales of alloys last year.

UNIFORM, PRECISE MOLDED PARTS WITH A CLEARING HYDRAULIC

Automatically . . . rings, blocks and discs of carbon graphite are briquetted on this 1,000 ton Clearing hydraulic press. The United States Graphite Company, Division of the Wickes Corporation is able to double the present size range of their product with this machine.

Briquetting pressure and speed, precisely controlled, makes it possible to exercise excellent quality control, produce a highly uniform product.

This custom engineered press is an example of the result when Clearing's Hydraulic Engineering group works with a customer to achieve a more efficient production method. Whatever your production requirements may be—compacting, stamping or drawing—call on a Clearing engineer to discuss your problem. You will find him helpful and there is no obligation.

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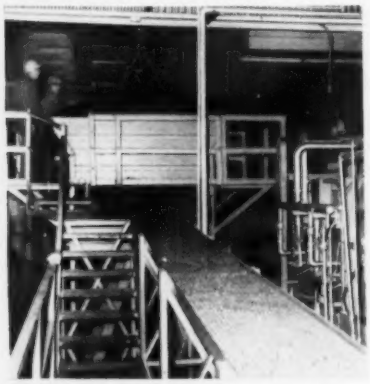
Armco Opens Chilean Grinding Ball Plant

Armco Steel Corp. has opened its newest industrial venture in South America, a plant to produce alloy steel grinding balls.



CHARGE: For grinding balls.

Located at Huachipato, Chile, the facility is a joint venture of Armco International Corp. and Compania Electro Metalurgica, S. A., of Santiago. It will produce balls mainly for the Chilean copper industry. They are used to pulverize copper ore.

Forging, sizing and heat treating facilities are now operating at the new plant. A metallurgical lab and complete machine shop are integral units.

Why Canada Trades With Communists

A Canadian steelmaker has answered U. S. critics of Canadian trade relations with Communist countries.

H. George De Young, president of Atlas Steels Ltd. of Canada, and chairman of the National Productivity Council, tackled this sore subject in a speech to the Economic Club of Detroit.

"The U. S. is now outselling Canada $7 to $1 in Soviet markets," he pointed out. "In the first six months of 1961, the U. S. sold $100 million to Cuba, Red China and the Soviet bloc. Canada sold $20 million.

"Actually, trading with the Communists is not frowned upon as much by Americans when it is done by Americans as when it is done by others," he said.

Mr. De Young pointed to Canada's adverse balance of payments, running from $148 million to $728 million annually since 1954. Almost the entire imbalance is due to trade with the U. S.

"Perhaps if you altered your competitive outlook to allow Canadians to compete for some of your manufactured goods markets, it could become not only unnecessary, but inexpedient, for Canada to trade with customers you do not approve."

Machinery Imports Plague Argentina

Argentina faces one of the worst trade deficits on record this year. It could hit $470 million.

Lagging exports and heavy imports of capital goods are blamed for the balance of payments problem. One Argentine economist points to the great increase in machinery and parts imports and asks, "How long can the country keep up such a harsh imbalance of trade in order to foster its long-desired industrialization program?"

Dr. Juan Onetto Gaona, chairman of the Argentine Industrial Union, notes that a total of 22 automotive factories is "something of a ridiculous figure for a country of 20 million."

Import curbs may have to be introduced. U. S. observers feel another international bailout for Argentina may also be required.

Communist "Dumping" Arouses Free World

Communist bloc exports and outright "dumping" have become a new menace for the Free World.

Latest to feel the backlash of Russian-Red Chinese "dumping" is the nonferrous metals market. Malaya suffered most when Russia "dumped" excess tin stocks on the market earlier this year. Bolivia may be forced to cut production if Russia continues to drive down prices by "dumping" tungsten on a market already over-supplied.

Russia and Red China are using much the same tactics in the economic war with the West. Their methods include: 1. No standard prices, with easy payment terms; 2. Use of dumping to upset markets and impose losses on ideological rivals; 3. Barter deals and partial payment in hard currencies; 4. Remarkably reliable deliveries.

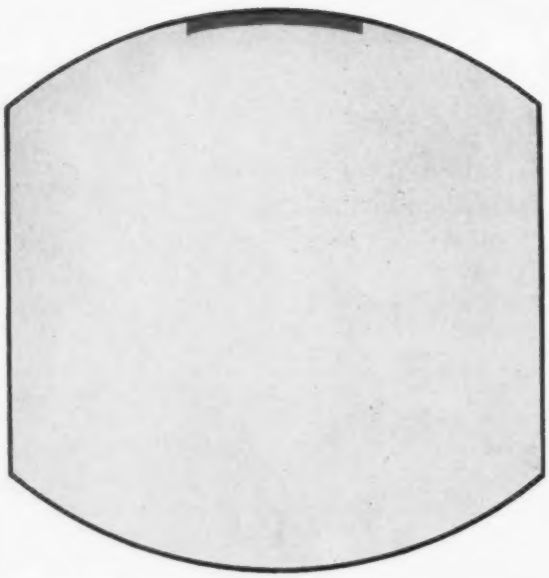
Prof. Leland Stowe, Univ. of Michigan, warns of the increasingly serious economic problems for the Free World as Communist bloc exports mount.

"We must devise sound countermeasures," he advises. "Many Americans are sleeping and don't know what is happening."

H. B. McCoy, president of the Trade Relations Council, agrees that information is the key to Western retaliation. He feels OECD (Organization for Economic Cooperation and Development) could fill this role and start an offensive against Communist disruption of world markets.

"Through OECD, principal countries could undertake a program to isolate or boycott buying from Russia and Red China," Mr. McCoy told The Iron Age. "With a coordinated consulting setup, OECD nations could beat the Reds at their own game."

NEW: Now, SKF's improved "C" type design extends contact area over the entire length of a longer roller element.



OLD: In older flanged type bearings, effective contact area was no longer than the red line.

CAPACITY:

SKF's new "C" type bearing increases capacity as much as 54% by giving the roller some growing space.

The space was always there, but, until the SKF "C" type bearing, it was occupied by undercuts and fixed flanges. SKF removed them so the roller could be lengthened over a wider raceway.

Result: *The SKF "C" type bearing increases capacity up to 54%—corresponding to more than 4 times longer service life.*

SKF PUT THE GREATER LENGTH TO WORK. Length alone is not enough. It's only the raw potential for greater load-carrying capacity. A high capacity bearing has to be designed to *realize* that potential. Here's how the "C" type does it:

- CLOSE OSCULATION, that is close conformity between rings and rollers, distributes load evenly over the *entire* length of the roller.
- AN AXIALLY FLOATING FLANGE, combined with the symmetrical roller, assures automatic and *even* distribution of load under any combination of radial and thrust loads.

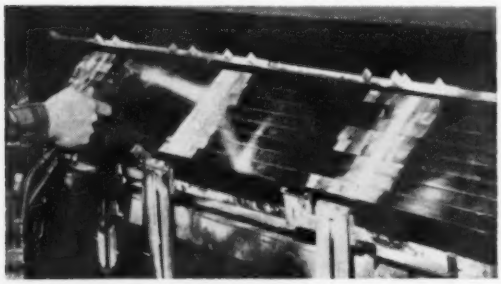
See for yourself! Ask your SKF man to show you his desk top demonstration of the new "C" type bearing. 6127

SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

Silver Spray for Aluminum

A new method for applying a hot-melt silver surface to aluminum offers several advantages. Propelled by a carrier gas, silver powder blasts through a special torch which directs it to the target. This method leads to significant savings in silver because only the necessary areas are covered. Also, since the silver's applied in the molten state, it forms an anodic bond with the aluminum. There's no oxide layer between the aluminum and its silver coating.



HOT MELT SILVER: Coats aluminum bus bar.

Vacuum Affects Fatigue Life

Study of environmental effects on high-temperature metal fatigue properties is now underway. Nickel, type 316 stainless and Inconel X are being checked by comparing fatigue life in air to that in a vacuum. Test temperature is 1500°F. Results indicate that at high strains, fatigue lives are superior in a vacuum. With decreasing strain, vacuum and air curves converge. Possible explanation: Surface absorption of gaseous impurities lowers surface energy. At the same time, oxidation provides more strength.

Computer Language Barrier

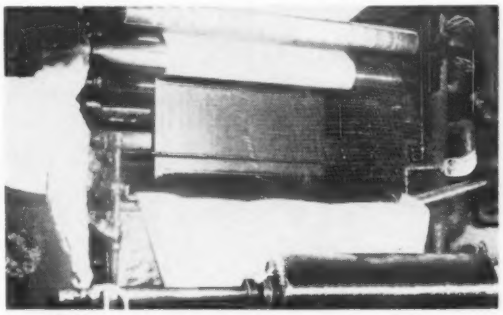
Research on computer-controlled machine tools underscores the communications barrier between man and machine. This stumbling block delays many applications; hampers others. One authority says ultimately man may talk to a machine and have it respond. One important first step in that direction is the recent development of computers that learn by running through a program once. Further steps will include pattern recognition devices to scan a page and pass the information to a computer in digital form. The computer would store this data for later use.

Powder Metallurgy Specs

Representing four years of work, a new standard refines, condenses and coordinates previous data for powder metallurgy parts. Basic objective is to assist the user in specifying the proper powder metallurgy product for his particular needs. Detailed specs cover 12 different materials. Three of the specifications are for bronze materials, three for brass, and the remaining six for iron or iron-base materials.

Tough, Magnetic "Paper"

Ever try to fight your way out of a wet paper bag? You might run into trouble if it's made of a new product that consists of fine steel wires bonded between two sheets of paper. This combination looks like paper, but it holds its shape like steel. It can be corrugated and formed with superior strength in all directions. It also retains the magnetic properties of steel.



PAPER SHEETS: Get steel-wire core.

Oxygen Steel and Scrap Use

Steelmakers contemplating a switch to oxygen are concerned about how to retain flexibility in the use of scrap. One proposed method centers on teaming up electric furnaces with LD basic oxygen vessels. In present U. S. practice, LD vessels only handle about 30 pct scrap. Since scrap runs about 25 pct in most home mills, this limitation makes it tough to capitalize on low scrap prices. Electric furnaces may be one answer.

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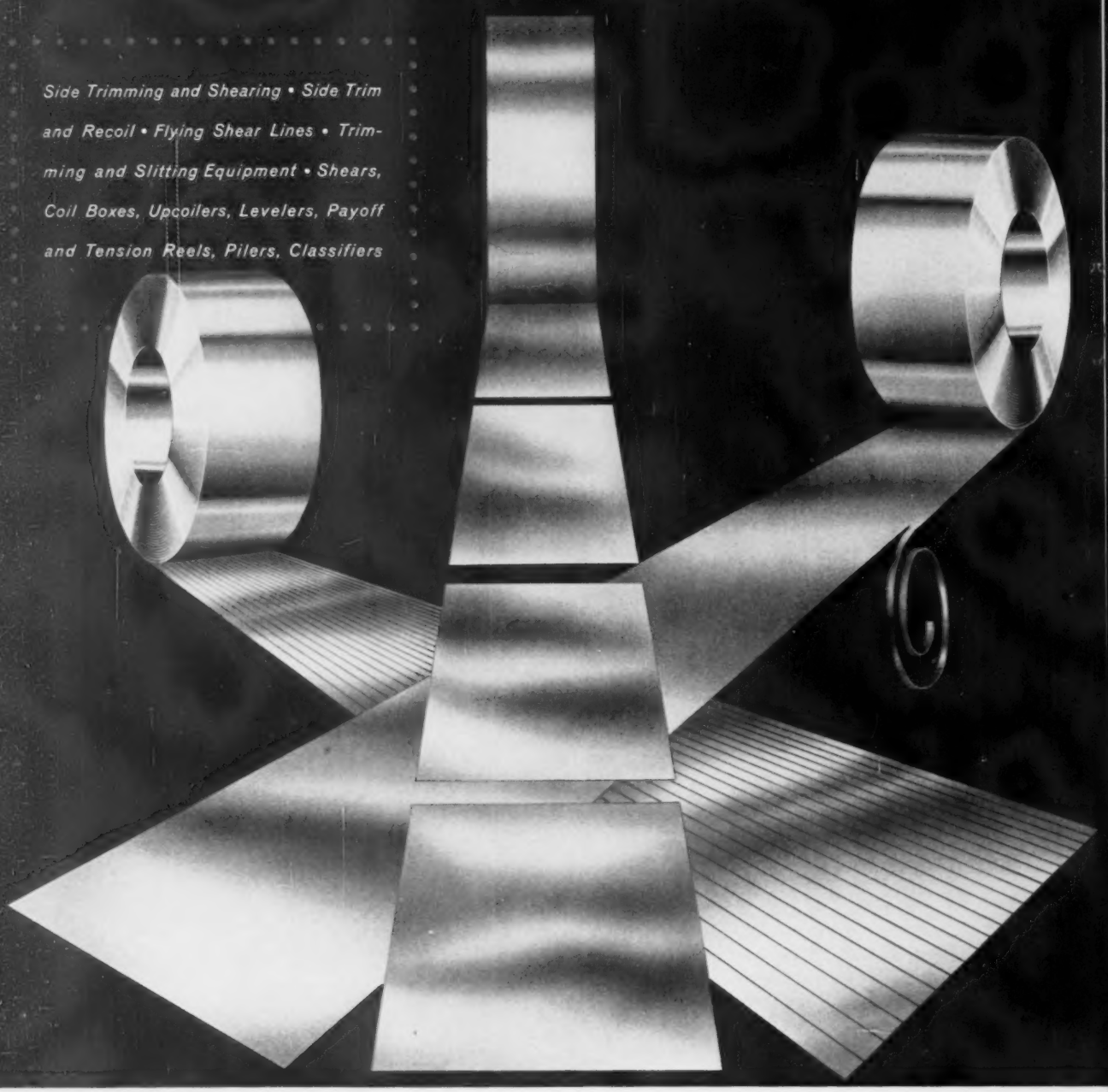

Any combination of Shear and Slitting Lines can be furnished by *Aetna-Standard Division*

Take any material... hot rolled or cold rolled, tin plate, stainless, or any other type.

Take any size coil... as heavy as 90,000 lbs.

Take any speed... shearing as fast as 1250 feet per minute in 60" widths and recoiling up to 4000 feet per minute in other widths.

Take any width... as wide as 100".

And Aetna-Standard Division has built equipment for shearing and slitting... in any combination.

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Letters Encouraged

The Iron Age encourages letters from readers on subjects of interest to metalworking. Unsigned letters are not published, but names are withheld on request.

Fully-Integrated

Sir—If you class Ford and International Harvester steel mills as the only two captive mills in the U. S. (How Ford Runs Its Steel Mill, IA, Nov. 23), how would you classify Timken's Steel and Tube Div. and Borg Warner's Ingersoll Steel Div. mills?—E. J. Wachter, Rockwell-Standard Corp., Los Angeles.

▪ Ford and International Harvester's mills probably should have been designated as the only fully-integrated captive mills. Ford, at 1.9 million tons annual rated capacity, and Wisconsin Steel Div. of International Harvester Corp., at 1.2 million tons capacity, are fully-integrated.

Timken Roller Bearing Co.'s electric furnace mill has an annual capacity of 700,000 tons; Ingersoll Steel Div. of Borg Warner Corp., 181,500 tons.—Ed.

Steelworkers Counsel

Sir—The writer enjoyed perusing your report on Arthur Goldberg (Can Steelworkers' New Counsel Replace Arthur J. Goldberg?. IA, Nov. 30).

As to an attorney or anyone else not being able to serve two masters, I am enclosing a copy of an excerpt from "The Weekly Labor Forecast and Review," Columbus, O., Nov. 25, which speaks for itself.—Charles D. Fagan, president, Sharpsville Steel Fabricators, Inc., Sharpsville, Pa.

▪ Mr. Fagan's enclosure says that Secretary of Labor Goldberg recently warned unions that they were harming the labor movement by constant internal bickering and urged greater organization.—Ed.

Sir—I can't say that I agree entirely on Mr. Goldberg's new role in this year's steel negotiations. While I do not question Mr. Goldberg's intent, which I'm sure is to represent President Kennedy, it is difficult to imagine him throwing off years of association with Dave McDonald and the Steelworkers. Also, we are all aware of Mr. Goldberg's belief on the role of the government in steel labor disputes. And we all know what that means.

But I would like to mention your very informative comments on the Steelworkers' new counsel. I have long wondered how Mr. Goldberg would be replaced and I have never read any other story which as much as mentioned the names Bredhoff and Feller. Well, we do agree they have their work cut out for them if they are to follow Mr. Goldberg. For better or for worse, his absence will be noted this year. Name withheld.

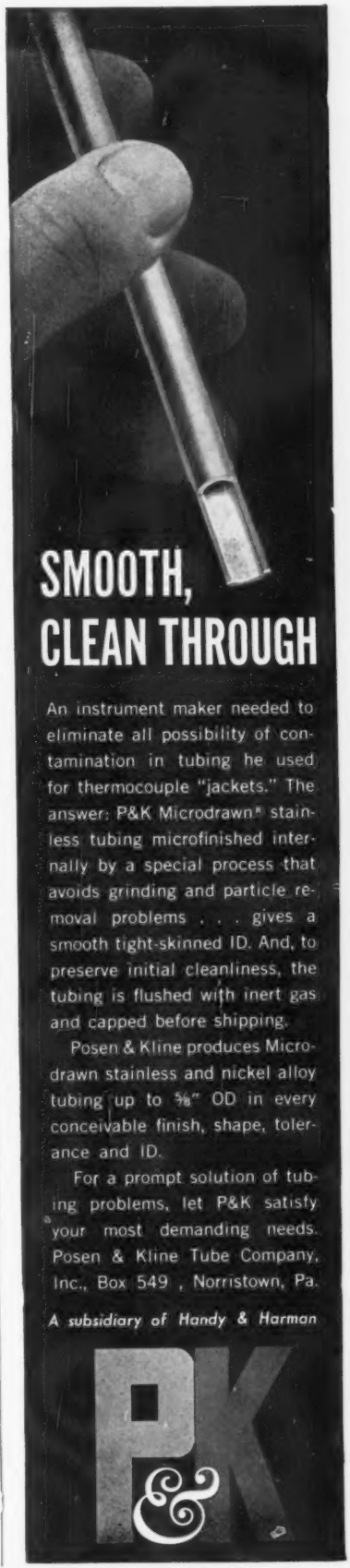
Soldering Aluminum

Sir—We were very interested in the article, "Flux-Free Technique Solders Aluminum to Stainless," which appeared in the Nov. 9 issue. Would you kindly send me reprints.—E. J. Minarcik, head, metal dept., National Lead Co., Brooklyn, N. Y.

Graphite Yarn

Sir—On the "Techfront" page of your Nov. 2 issue, you mention a new graphite yarn (Graphite Yarn for 5000°F).

Since we make products requiring insulation that can withstand "high" temperatures, we would be interested in learning the source of this yarn.—G. Pufall, model shop manager, Precision Scientific Co., Chicago.


SMOOTH,
CLEAN THROUGH
An instrument maker needed to eliminate all possibility of contamination in tubing he used for thermocouple "jackets." The answer: P&K Microdrawn® stainless tubing microfinished internally by a special process that avoids grinding and particle removal problems . . . gives a smooth tight-skinned ID. And, to preserve initial cleanliness, the tubing is flushed with inert gas and capped before shipping.
Posen & Kline produces Microdrawn stainless and nickel alloy tubing up to ⅝" OD in every conceivable finish, shape, tolerance and ID.
For a prompt solution of tubing problems, let P&K satisfy your most demanding needs. Posen & Kline Tube Company, Inc., Box 549 , Norristown, Pa.
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P&K

End Your Tool Steel Problems with the A-L STEELECTOR System

STEELECTOR

Save Selection Time, Insure Accuracy, Cut Inventory Costs

If you started using the new Allegheny Ludlum STEELECTOR Program first introduced last year, you know what savings it can bring. If you didn't, your competitors may have stolen a march on you.

There are many advantages in the STEELECTOR system. Perhaps most important is the savings in selection time. No longer need anyone spend hours in tool steel selection. By using one of the STEELECTOR Cards, an accurate selection can be made virtually at a glance. In seconds you can choose the tool steel grade with the particular combination of red hardness, abrasion resistance, size stability, toughness, and machinability required by the job at hand.

You can select STEELECTOR tool steels with confidence—they are always in stock. You don't have to stockpile tool steel. Instead, by relying on Allegheny Ludlum material and using STEELECTOR grades, you can reduce the variety of tool steels in your inventory. You reduce problems because the STEELECTOR offers the tool steels that are right for your jobs, eliminates those that contribute nothing but confusion.

STEELECTOR Cards Save Selection Time

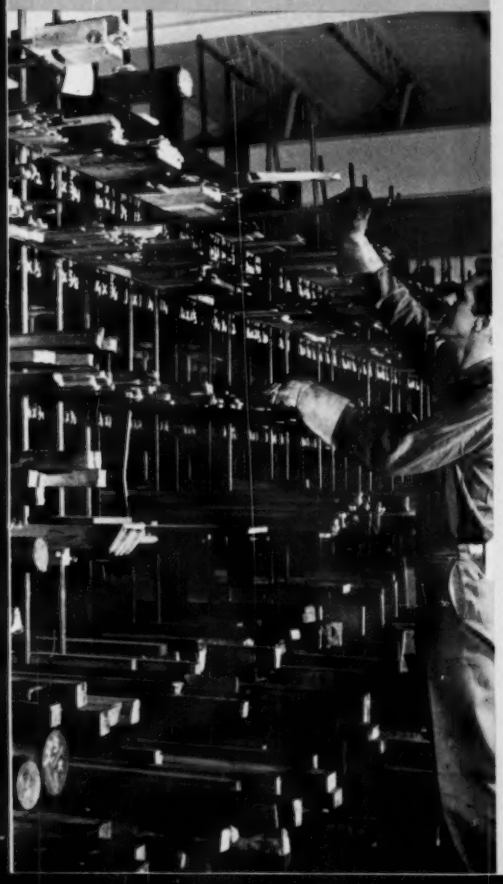
The three STEELECTOR Cards insure that you will pick the right tool steel for every application. Each STEELECTOR Card (there are cards for tool room, hot work, and high speed applications) uses bar graphs to indicate the relative abrasion resistance, toughness, size stability, machinability, and red hardness of the STEELECTOR grades. You can select the best combination of properties for the job at hand virtually at a glance.

STEELECTOR tool steels will meet your job requirements. You can clean house with the STEELECTOR Program. No longer need your stockroom be cluttered with small stocks of scores of grades. No longer need you find yourself holding grades that require different processing, yet give the same results. And you never need to worry about running short. Allegheny Ludlum STEELECTOR grades are always in stock.

STEELECTOR Program Ends Supply Problems

Huge warehouse stocks back up Allegheny Ludlum's STEELECTOR Program. You know before you order that the grade you have selected is in stock, in the size you choose. Here's how the STEELECTOR System works:

First, you select the right tool steel for your job by using a STEELECTOR Card. Then you check the STEELECTOR Data Stock List for the particular grade selected best for your job. (There is a List for each of the 18 STEELECTOR grades.) All sizes and shapes in stock are listed along with hardening, tempering, and annealing temperatures. The List also gives the typical analysis of the steel, its AISI number, and describes its properties. Typical applications are listed along with suggested working hardnesses to confirm your selection.



Free Booklet Explains the STEELECTOR System

You will find a complete description of the STEELECTOR Program in this colorful 10-page Allegheny Ludlum booklet. It tells how the STEELECTOR System helps you pick the right tool steels, save time, and end your supply worries.

Each of the STEELECTOR grades is listed in the booklet along with its description, applications, and AISI type number. Included are three handy STEELECTOR Cards that will save you time in picking the right steel for tool room, hot work, and high speed applications. Everyone who helps select tool steel needs this booklet. For your free copy ask your A-L representative, or write: Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. TS12.

What Can The A-L STEELECTOR Program Do For You?

Whether you are president, purchasing agent, stock room supervisor, engineer, or heat treater, you will find the STEELECTOR System can save you time, reduce costs, and make your job easier. Check this list and see how the STEELECTOR System can help you:

Owner, president or vice president. Reduces costs in warehousing, purchasing, and inventorying. Insures selection of the right tool steel—prevents misapplication and wrong heat treatment.

Operating man, superintendent, foreman, production control man. Ends availability problems. Large local warehouse stocks enable your in-plant stocks to be reduced. Consistent high quality.

Engineer or metallurgist. Speeds selection of the right tool steel . . . saves the time formerly spent in selection for jobs that need it.

Specifier, designers, tool room man. Assures you of the availability of the size and grade you need. Only 18 grades to consider for 96 percent of all applications.

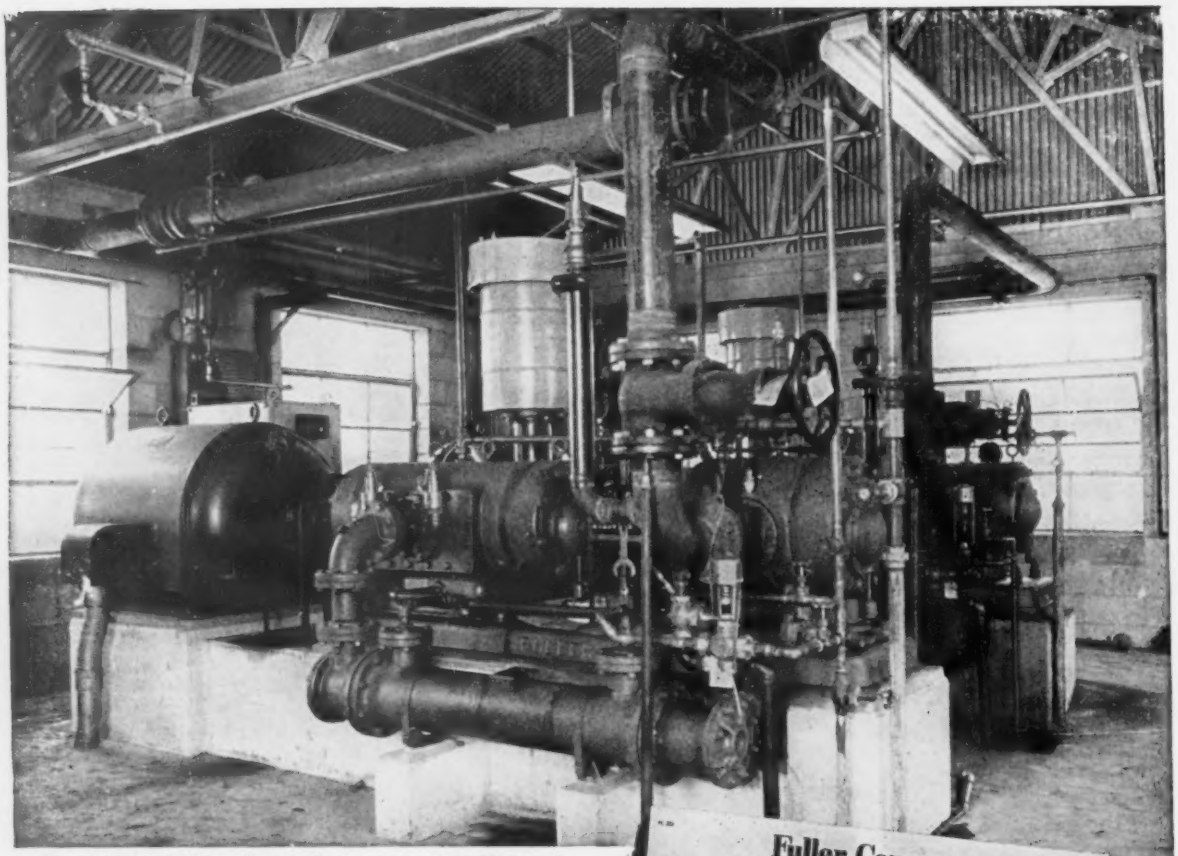
Stock room supervisor. Saves storage space because fewer grades need to be stocked. Ordering is simplified and paperwork reduced.

Heat treater. Helps you operate furnaces more profitably —more tools can be treated at a time.

Purchasing agent. Reduces paperwork and inventory needs.

To learn of all the benefits of the A-L STEELECTOR System, ask for the STEELECTOR booklet described in the adjoining column. 3297

ALLEGHENY LUDLUM AL®



Two C135/135H Fuller Rotary Compressors at the Herbrand Division of the Bingham-Herbrand Corp., Fremont, Ohio, leading manufacturer of forged mechanics' hand tools and steel forgings for the automotive industry. Each compressor is rated 680 cfm, atmosphere to 100/110 psig., at 690 RPM.

Here's the 4-Year Maintenance Bill on Fuller Rotary Compressor at Herbrand Division of Bingham-Herbrand Corp.

So satisfactory was the performance of its first Fuller Rotary Compressor, installed in 1956, that Herbrand Division installed another like it 3½ years later.

When the older unit was inspected after four years operation, no replacement of parts was necessary. After installation of a new gasket (cost $9.35)—to replace the one that had to be removed to make inspection—the compressor continues to add to its service record.

The newer compressor has also been entirely trouble-free, and Herbrand plans a third, when increased air capacity is required. It, too, will be a Fuller—for, as Herbrand says, "These compressors can be classified as maintenance-free."

Because Fuller Rotary Compressors are practically vibration-free, they can be installed without complicated or expensive foundations or structural modifications. They are simple and efficient, with no valves to leak, no seats to grind. Blades automatically compensate for wear. They have forced-feed lubrication to all parts within the cylinder. Rotor, bearings and blades are the only moving parts.

Fuller Compressors range from 30 to 3300 cfm, pressures to 125-lb. gauge.

Write for Bulletin C-5A. It tells the whole story.

See Chemical Engineering Catalog for further details and specifications.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

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Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

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....pioneers in harnessing AIR

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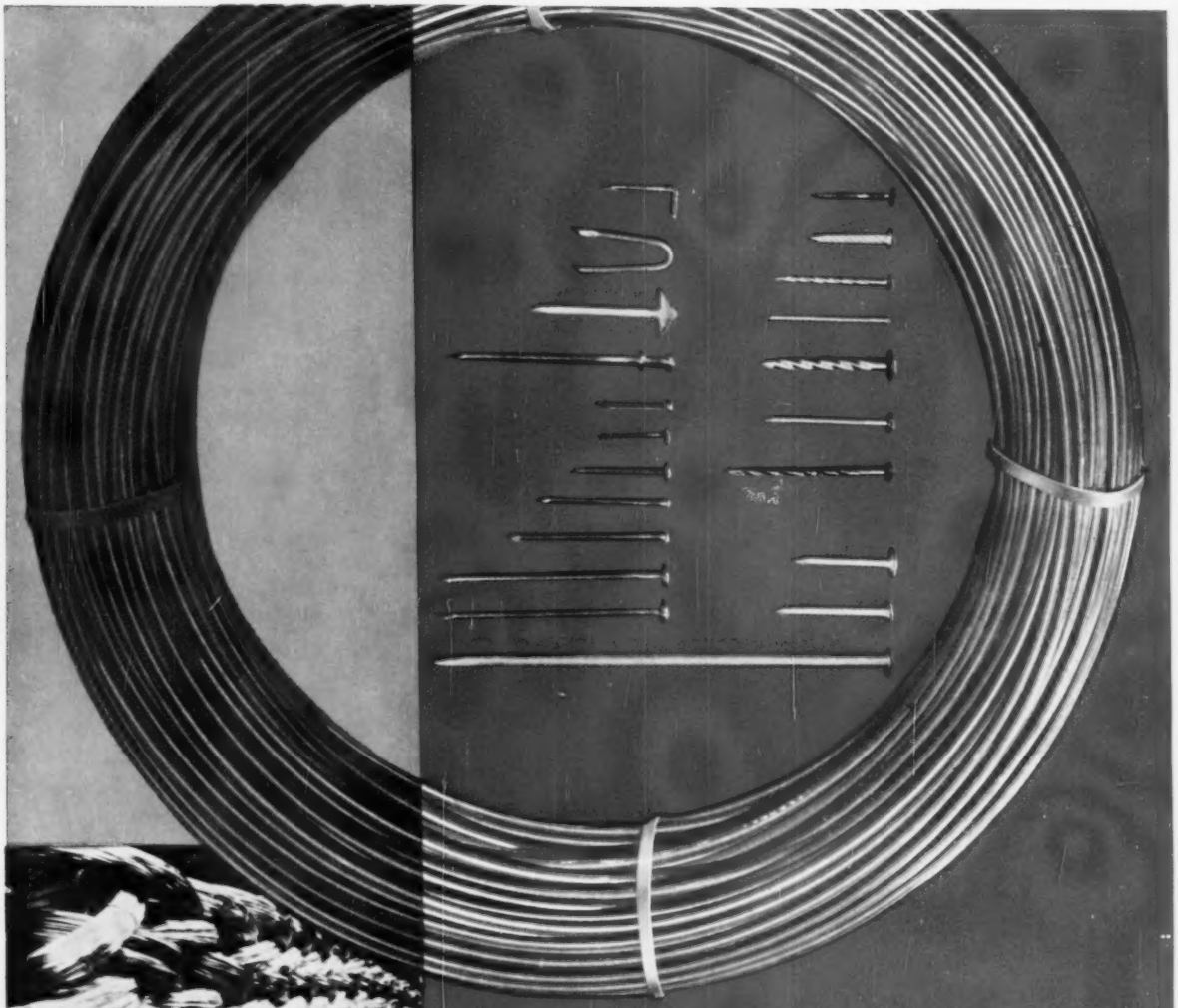

Quality Products Pay for Themselves!

In the long run good quality products always pay for themselves. To the consumer a well made product, whether it is a simple nail or an automobile, means satisfaction and economy through long use; to the manufacturer, good quality materials mean dependability and high reputation. These simple but basic principles have guided Yawata through long years of research and manufacturing experience. Yawata's wire rods, for example, are made from basic open hearth steel in strict accordance with the grades and gauges specified by JIS, AISI, SAE and other standards. All physical and chemical properties are rigidly controlled and guaranteed to meet every specification. Yawata's mild or hard steel wire rods are shipped in coils weighing 705.5 lbs—and are especially suitable for the manufacture of nails, wire, wire nettings, wire laths, wood screws & rivets. The company also produces a variety of other wire products including cement-coated nails, screw nails, and staples or duplex nails. The Yawata seal of approval always means highest quality, economical products.

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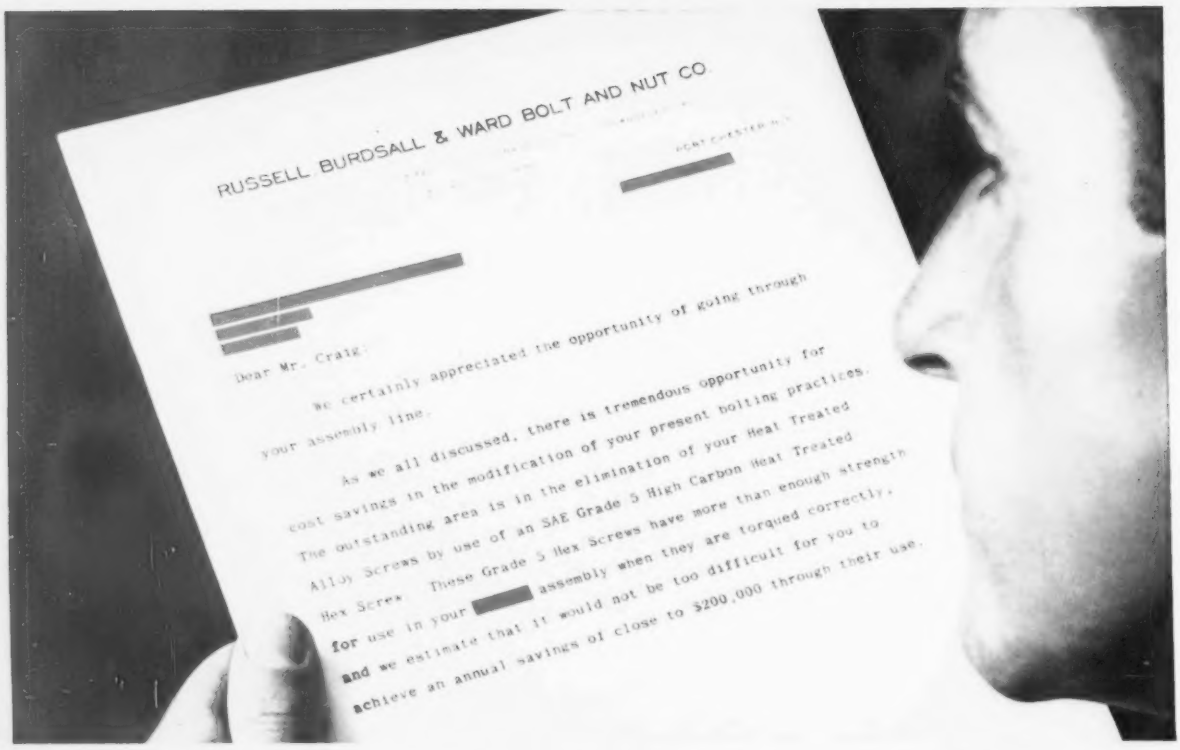

RUSSELL BURDSALL & WARD BOLT AND NUT CO.
Dear Mr. Craig:
We certainly appreciated the opportunity of going through
your assembly line.
As we all discussed, there is tremendous opportunity for
cost savings in the modification of your present bolting practices.
The outstanding area is in the elimination of your Heat Treated
Alloy Screws by use of an SAE Grade 5 High Carbon Heat Treated
Hex Screw. Those Grade 5 Hex Screws have more than enough strength
for use in your [redacted] assembly when they are torqued correctly,
and we estimate that it would not be too difficult for you to
achieve an annual savings of close to $200,000 through their use.

Eliminates big waste of dollars

Fastener value analysis study by RB&W reaps rewards without design changes

You see above an excerpt from a letter written to a large manufacturer by an RB&W technical advisor. Subsequently he submitted two detailed reports to document how savings could be achieved.

Because of the nature of the product involved, the manufacturer didn't want to make engineering changes. They preferred an alternative RB&W recommendation—substituting the proper standard screw in place of alloy screws—size for size. The cost reduction made possible: nearly $100,000 annually!

Opportunity for savings may not be so great at your plant. But they're bound to be worthwhile.

For instance, the difference in cost between a $\frac{3}{8}$ x 1 socket-head screw and a bright hex screw is about 5¢. Not much of a saving in itself. But suppose you use 150 of these socket-head screws in just one product. The saving is $7.50 per unit. If you produce 1000 units each year, that's savings of $7,500. With a line of ten such products, the *profits* saved would conceivably be $75,000 or more.

This is "value analysis" with a high dollar dividend. Take advantage of it by consulting with an RB&W Fastener Specialist. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

R B & W
117th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Sales office and warehouse at: San Francisco, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas.

FATIGUE CRACKS

Pushbutton Santa

If you are stuck and don't know what to buy the wife for Christmas, you might drop in at the John Wanamaker store in Philadelphia. An IBM RAMAC 305 computer is set up there to help shoppers select gifts.

Here's how it works: A shopper checks out spaces on an IBM card that describe the person for whom he is gift-hunting. This data includes age, sex, general area of interest and desired price range. There is even a check point for "the person who has everything."

The card is then given to an attendant who pushes the buttons that set the computer to searching its one-million-word memory for names of gifts that most likely match the person's description.

Then, in just half-a-second, out pops a typed list of ten suitable gifts. The typed sheet also tells where the items can be located in the store and the prices of each gift.

Wanamaker's thoughtfully provides an order desk nearby to further save shopping steps.

The pushbutton shoppers' guide is expected to handle more than 40,000 inquiries during the four-week period before Christmas.

BUTTON PUSHER: Actress Faye Emerson Christmas shops with IBM RAMAC 305.

Industry Use?—Some alert purchasing agents may see bright hope in this latest computer development. They may ask IBM if they have a machine where a buyer can push buttons and find the most suitable item from the most reliable supplier at the best price.

Other PAs may get to the heart of the matter. They may ask if there is a super-computer where each day's purchase requisitions — all marked "urgent," of course—can be tumbled into a hopper and come out marked as they really should be.

PA's at Christmas

Speaking of Purchasing Agents and Christmas at the same time, another thought was contributed by associate editor John Baxter. We have mentioned before that he is a former PA, so you can understand why he is PA-minded.

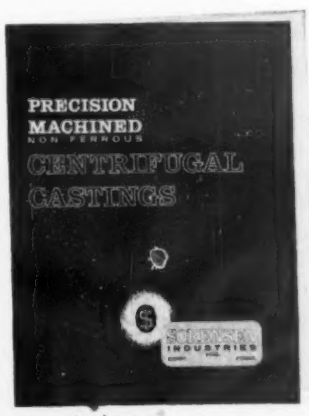
He noticed that in our mail, lately, we have received a number of copies of notices sent out to employees of many companies, some of them very pointedly aimed at the purchasing departments.

These notices spell out in definite terms the company's policy on what employees can accept, and what they can't accept, in the way of Yuletide gifts.

John recalls that it has been the practice of many suppliers to drop off a token of esteem with PAs in the way of the season's greetings. He says that at one time, liquid tokens predominated. Then there was a shift to things for the home, even for wives. Of course, it was always as a gesture of appreciation, of fairmindedness, nothing else, he says.

Now, he points out, these restrictions make it very difficult for suppliers to make that gesture and they have real problems at this time of year.

To help out these troubled suppliers, he suggests they could approach the computer, have these restrictions cranked in, accept the advice, and walk to the correct department with a clear conscience.



FREE BROCHURE

gives you the facts about

PRECISION MACHINED

NON-FERROUS

CENTRIFUGAL CASTINGS

Dense, fine-grained, flawless —
in a wide range of alloys —
for exceptional performance.

SORENSEN
INDUSTRIES
INC
DARBY 10, PENNSYLVANIA

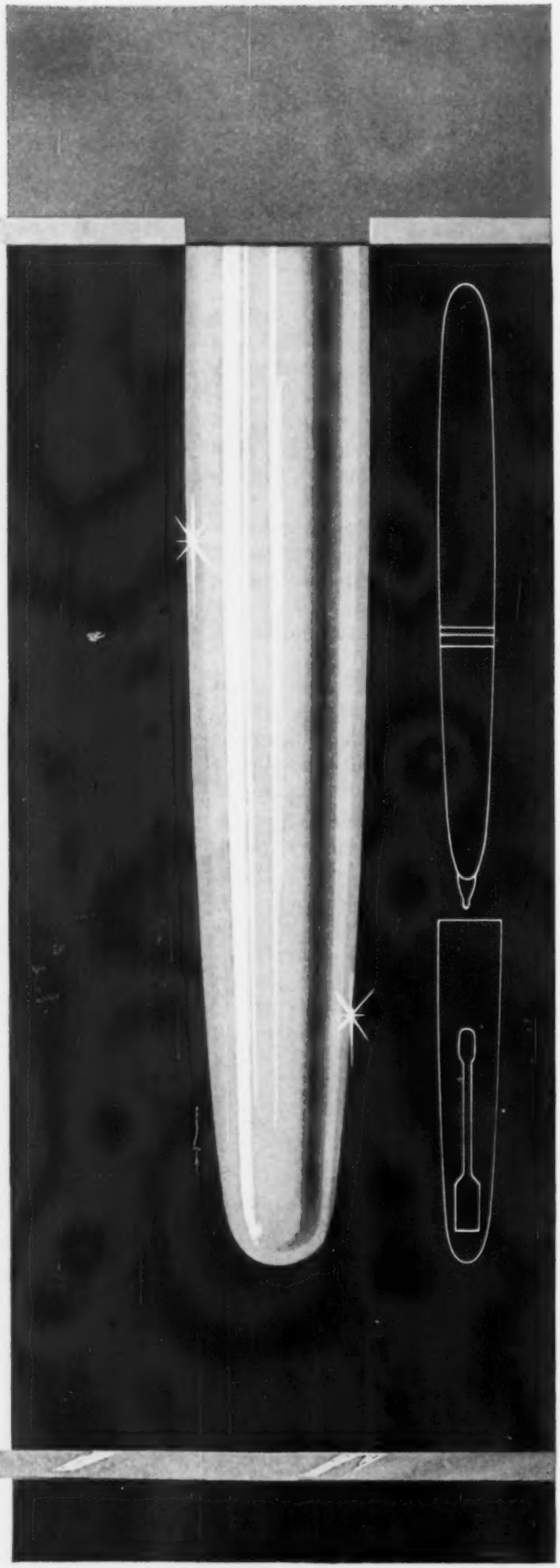
FORMBRITE

SUPERFINE-GRAIN DRAWING BRASS

smooth and easy on the draw!

Formbrite . . . an exclusive Anaconda product, is springier, harder, more scratch resistant . . . provides better finish before and *after* forming . . . than the usual drawing brasses in the same standard tempers. It has remarkable ductility for forming and drawing—even such deep-drawn products as pen barrels. Yet it costs no more than ordinary drawing brass, despite its superiority.

When you buy or specify Anaconda American Brass, you can choose from nearly 300 different alloys . . . the greatest range of sizes, shapes, tempers and characteristics in Copper and Copper Metals. Contact your Anaconda representative or write: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 61-1166



FORMBRITE®

a product of

ANACONDA®

AMERICAN BRASS COMPANY

COMING EXHIBITS

Materials Research Conference—Rensselaer Polytechnic Institute, Dec. 18-19.

Plant Engineering & Maintenance Show — Jan. 22-25, Convention Hall, Philadelphia.

Electrical Engineering Show—Jan. 29-Feb. 2, New York Coliseum.

MEETINGS

JANUARY

Reliability and Quality Control — Eighth national meeting, Jan. 9-11, Statler Hilton Hotel, Washington, D. C.

National Barrel & Drum Assn.—Annual meeting, Jan. 11-13, Americana Hotel, Miami Beach, Fla. Assn. headquarters, 1343 L St., N. W., Washington, D. C.

Institute of Scrap Iron & Steel—Annual convention, Jan. 14-17, Statler-Hilton Hotel, Washington. Institute headquarters, 1729 H St., N. W., Washington.

Assn. of Consulting Management Engineers, Inc.—Annual business meeting, Jan. 15, University Club, New York. Assn. headquarters, 347 Madison Ave., New York.

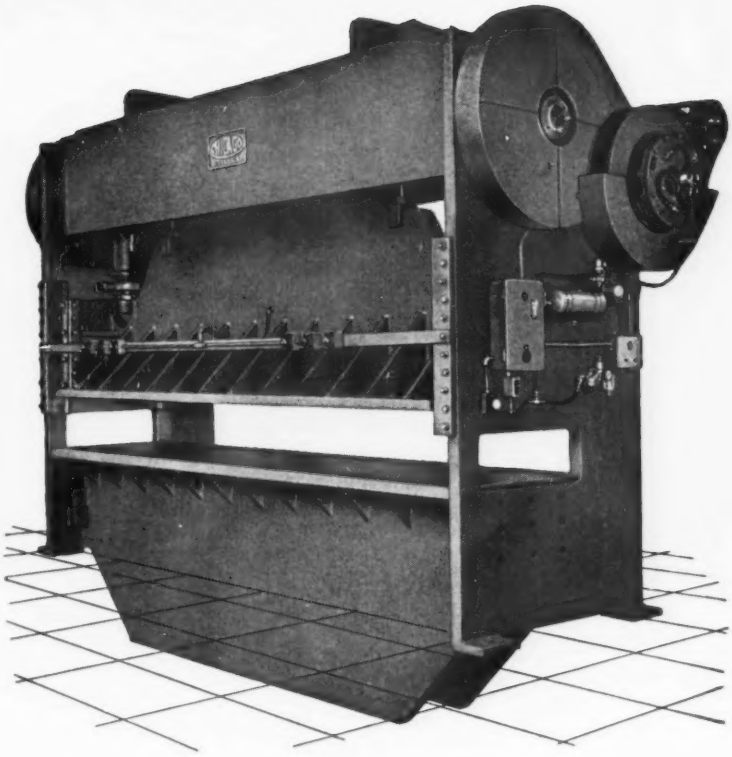
Mining Symposium—University of Minnesota and Minnesota Section, AIME, joint meeting, Jan. 15-17, Duluth Hotel, Duluth, Minn.

Compressed Gas Assn. — Annual meeting, Jan. 15-17, Waldorf-Astoria Hotel, New York. Assn. headquarters, 500 Fifth Ave., New York.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 15-19, Mountain Shadows Hotel, Scottsdale, Ariz. Assn. headquarters, 105 W. Madison St., Chicago.

Industrial Heating Equipment Assn,. Inc.—Winter meeting, Jan. 22-23, The Drake Hotel, Chicago. Assn. headquarters, 2000 K St., N. W., Washington, D. C.

(Continued on P. 26)



CHICAGO DREIS & KRUMP

PRESSES

STRAIGHT-SIDE TYPE

large die area

capacities up to 400 tons

This is a typical model of CHICAGO straight-side-type presses used for multiple punching, notching, and trimming operations. This press with a die area of 48 inches by 198 inches has a capacity of 200 tons.

Complete recommendations for any job on request.

E674

CHICAGO DREIS & KRUMP

Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

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Fastest Draw In The West!

And what a draw Portland's giant new straight-line bulk unloader furnishes . . . 900 tons-an-hour—the only facility of its kind on the Pacific Coast.

Backed up by a 140-car rail yard and huge open storage space, Portland's new unloader provides the cheapest and fastest transfer from deepwater ship to domestic carrier. It will handle all types of vessels —all types of dry bulk cargoes.

If you import dry bulks—or are in the market for an industrial plant site with access to a high-speed bulk discharging pier—set your sights on Portland Harbor where YOU pocket the savings from modern cargo handling!

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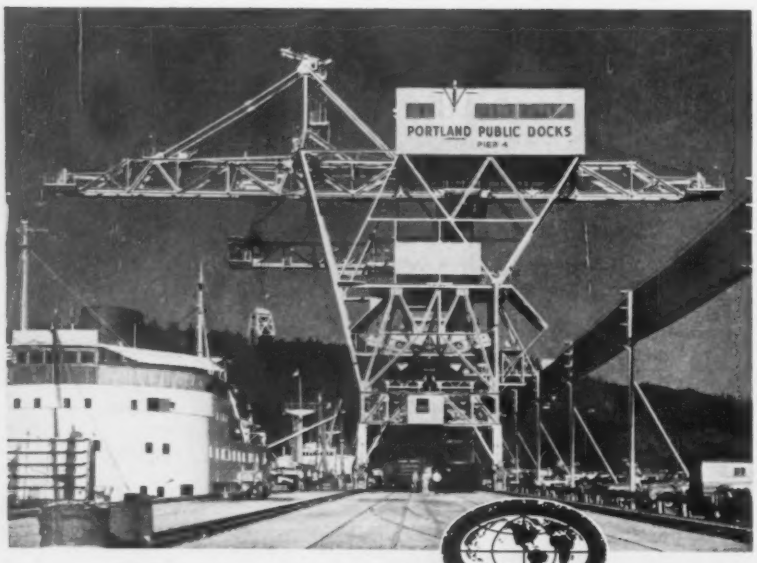
Send for Complete Information!



WRITE: Sales-Traffic Department

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or Eastern Office

PORTLAND PUBLIC DOCKS c/o BUCKLEY & CO.
170 Broadway, New York 38, N.Y. TWX NY1-2578

3070 N.W. Front Ave.
Portland 10, Oregon
CA 8-8231
Cable (DOCOM)
TWX PD309U

MEETINGS

(Continued from P. 25)

Aluminum Assn.—Annual meeting, Jan. 24-26, New York. Assn. headquarters, 420 Lexington Ave., New York.

American Sprocket Chain Manufacturers Assn.—Annual meeting, Jan. 25-26, Drake Hotel, Chicago. Assn. headquarters, 819 South Aldine Ave., Park Ridge, Ill.

Truck Trailer Manufacturers Assn.—21st annual convention, Jan. 28-31, Palm Springs Riviera Hotel, Palm Springs, Calif. Assn. headquarters, 710 Albee Bldg., Washington.

Associated Equipment Distributors—43rd annual meeting, Jan. 28-Feb. 1, Hilton Hotel, Chicago.

Society of Plastics Engineers, Inc.—Annual technical conference, Jan. 30-Feb. 2, Penn-Sheraton Hotel, Pittsburgh. Institute headquarters, 65 Prospect St., Stamford, Conn.

Midwest Welding Conference—8th annual, Jan. 31-Feb. 1, Technology Center, Illinois Institute of Technology, Chicago, Ill. Institute headquarters, 35 West 33rd St., Technology Center, Chicago.

FEBRUARY

American Society for Testing Materials—Committee week, Feb. 5-9, Statler-Hilton Hotel, Dallas, Tex. Society headquarters, 1916 Race St., Philadelphia.

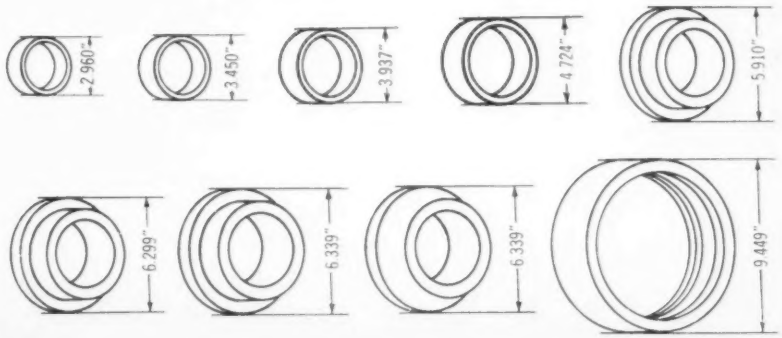
Materials Handling Institute, Inc.—Spring meeting, Feb. 6-7, Hilton Inn, Atlanta, Ga. Institute headquarters, One Gateway Center, Pittsburgh.

Industrial Truck Assn. — Spring meeting, Feb. 8, Hilton Inn, Atlanta. Assn. headquarters, One Gateway Center, Pittsburgh.

American Coke & Coal Chemical Institute—Eastern regional meeting, Feb. 8, Drake Hotel, Chicago. Institute headquarters, 711 Fourteenth St., N. W., Washington, D. C.

DISC GRINDS 9 DIFFERENT BEARING RACES

tooling on 2H30 handles bearing races from 2.9" to 9.4" diameter

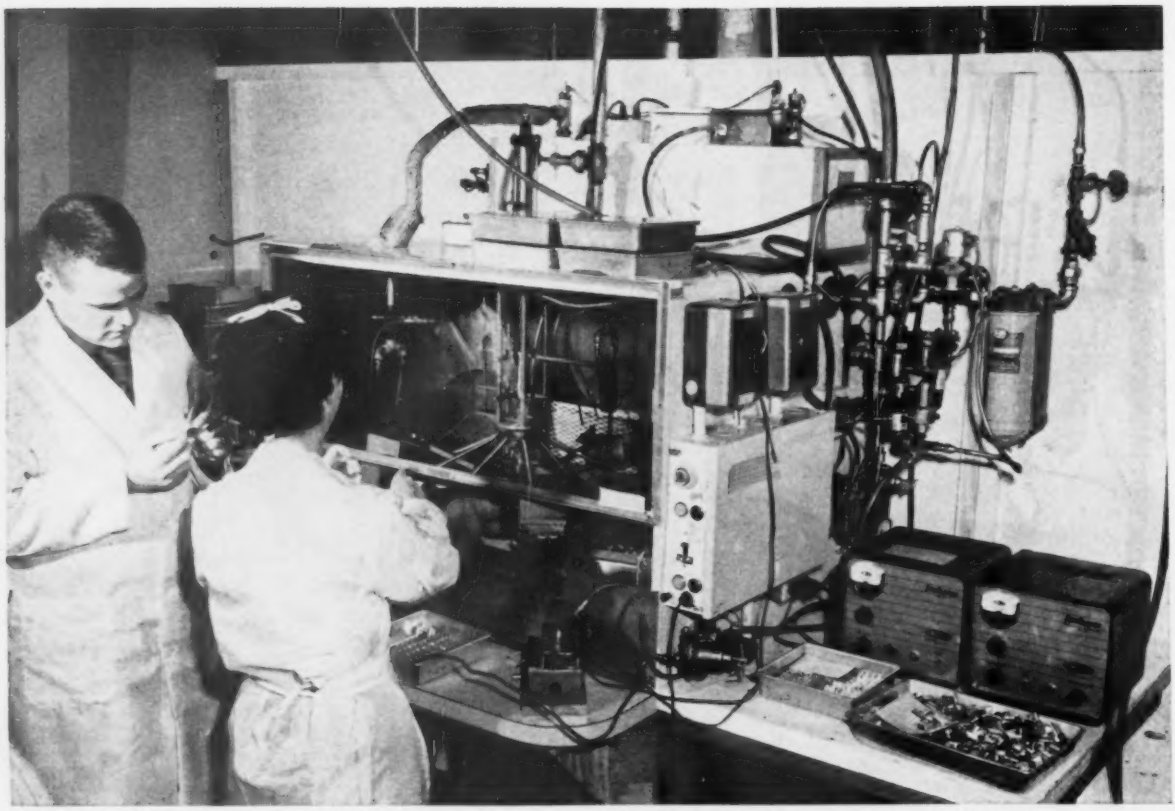


Gardner 2H30 Precision Double Spindle Disc Grinder with feed thru fixturing.

grinds two sides parallel in one operation

GARDNER

GARDNER MACHINE COMPANY, BELOIT, WISCONSIN



Charles Parke, production engineer at the Potter and Brumfield plant, a division of American Machine and Foundry Company, spot checks a part while operator removes remaining components from the cleaning system.

"WE MAGNIFY EACH PART 10 TIMES . . . DON'T FIND GREASE AFTER A NIALK® TRICHLOR BATH"

Workers handle delicate microminiature relays with utmost care in Potter and Brumfield's "white room." Yet some contamination with dust and grease is inevitable.

"We assume everything is contaminated," continues Charles Parke, production engineer—and orders all of the minute parts cleaned with Nialk TRICHLOREthylene.

100,000 parts between cleanouts.

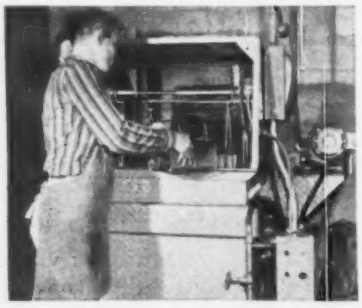
According to C. R. Stone, Director of Production, Nialk Trichlor removes the last bit of film on the metals. Potter and Brumfield degreases magnetic iron and nickel silver, running about 100,000 parts through between cleanouts.

They tried another vapor degreasing solvent, but "it didn't do the job Nialk Trichlor does. It wasn't distilling right and it wasn't doing the cleaning job."

Though much metal goes through every degreasing bath, this company doesn't have to titrate or run other tests.

Flush and vapor degrease—one trichlor

Potter and Brumfield uses one grade of trichlor for both flushing and vapor degreasing, considers this an important benefit.



And Mr. Stone concludes, "Hooker should get a large share of credit for the quality of parts produced by Potter and Brumfield."

You can get the same dependable cleaning with nonflammable Nialk TRICHLOREthylene.

Hooker technical experts will help you set up your system. Then they'll check back with you regularly to make sure your flushing or degreasing operation stays trouble-free.

Talk to your Hooker Chemical distributor. He'll gladly help you with your problems and questions.

Or write us direct. We have years of experience to put at your disposal.

HOOKER CHEMICAL CORPORATION

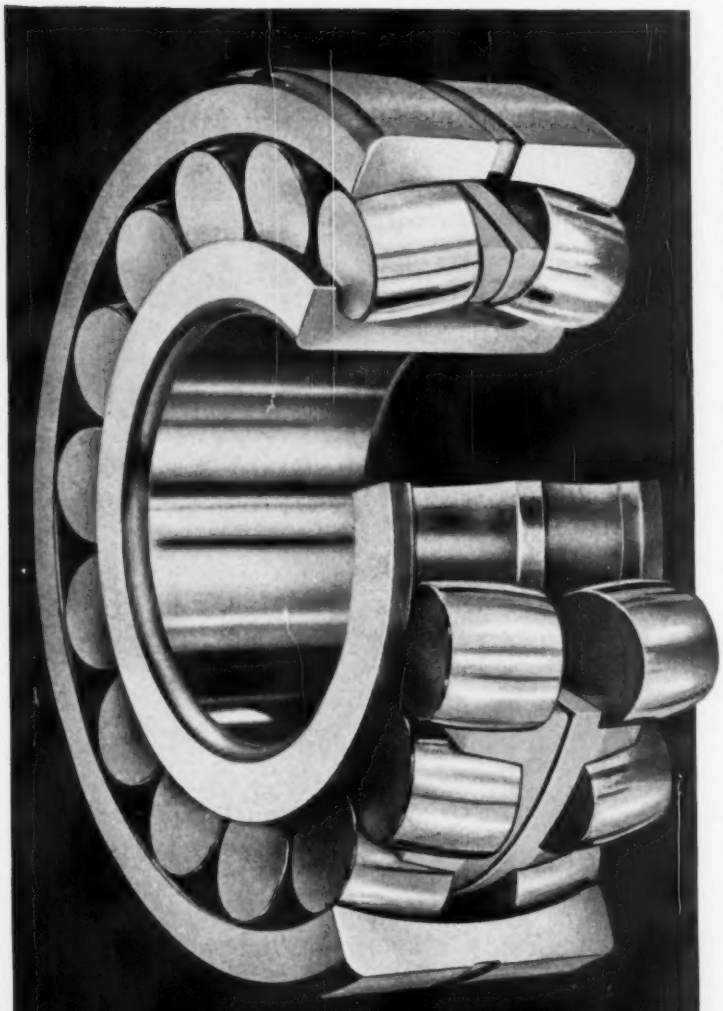
3 1 2 UNION STREET, NIAGARA FALLS, NEW YORK

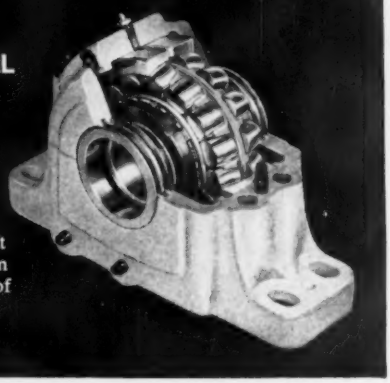
HOOKER CHEMICALS PLASTICS

Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.

LINK-BELT SPHERICAL ROLLER BEARINGS:

measure these design values in terms of your applications





LINK-BELT SPHERICAL ROLLER BEARING PILLOW BLOCKS

Made with sturdy gray iron or super-rugged cast-steel housings. Adapter mounting types for shafts from 1 3/16" to 10½" and direct-shaft mounting types for shafts from 1.7717" to 11.0236". Choice of rugged steel, multi-labyrinth or Dacron-contact seals.

GREATER CAPACITY!

The reason? *More rollers, larger rollers!* Bearing capacity depends primarily on effective roller Length, roller Diameter and Number of rollers (L x D x N). And Link-Belt offers the *largest effective roller complement* for all sizes of spherical roller bearings . . . rated according to accepted formulas of the Anti-Friction Bearing Manufacturers Association. This increase in LDN values provides extremely high capacity . . . and in users' evaluation, it adds up to far longer bearing life.

GREATER DURABILITY!

With balanced proportion design, Link-Belt spherical roller bearings possess durability characteristics that exceed the bearing industry's exacting requirements. Optimum balance of rollers, inner and outer rings must be obtained for increased bearing capacity . . . yet overall bearing dimensions must conform to an established international standard boundary plan.

Wrap-around, completely contoured retainers also contribute to durability through positive roller guidance and spacing. Precision-machined of centrifugally cast bronze, these husky retainers are far stronger than stampings or sand castings.

GREATER PRECISION!

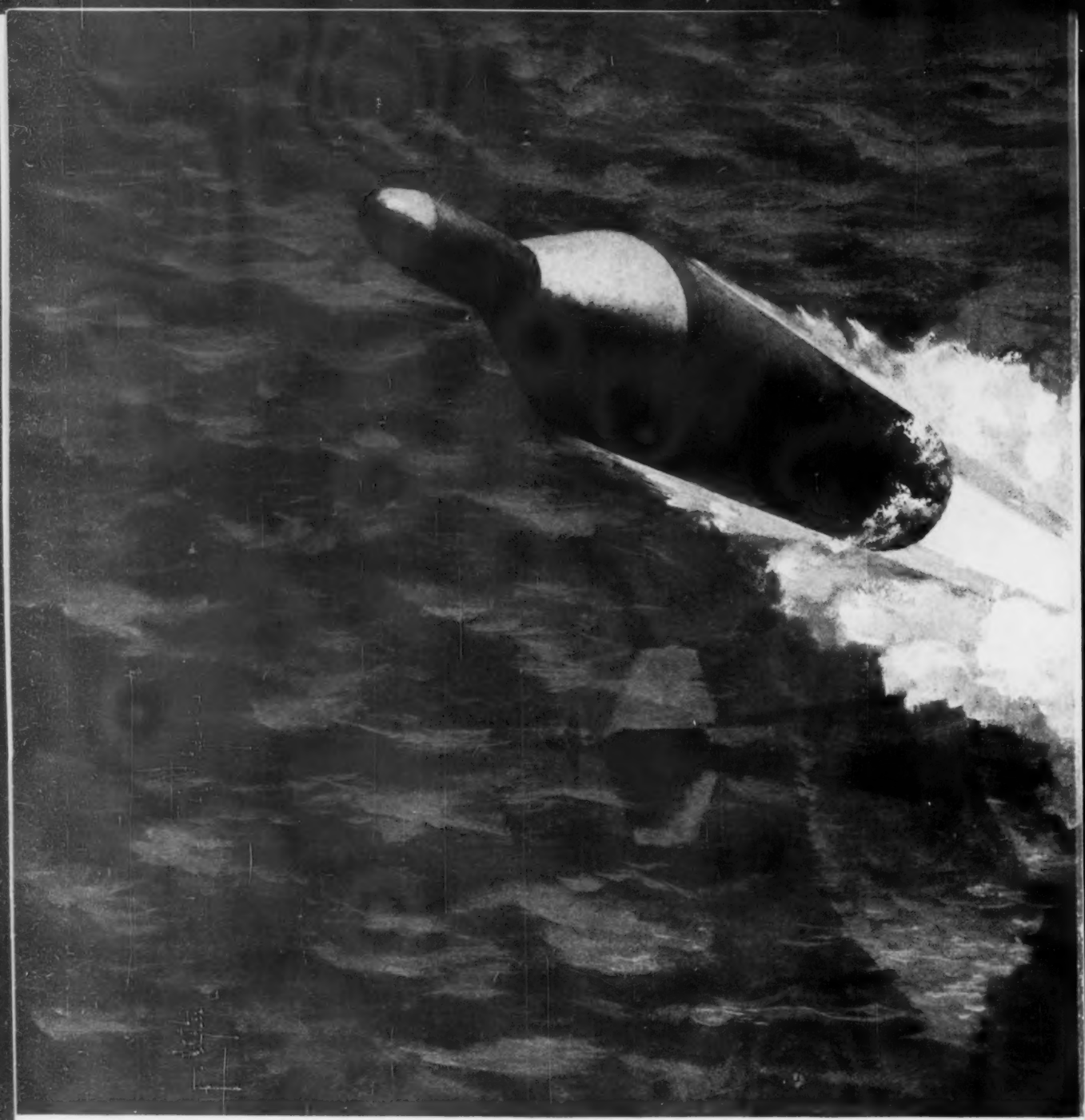
Link-Belt spherical roller bearings are made in the world's most modern bearing plant . . . with the most-advanced tools and techniques known to industry. A rigid quality control program leaves *nothing* to chance. Each Link-Belt bearing is subjected to *758 actual inspections*. Microsmoothness and precision are continuously scrutinized by automatic machines. Result: these bearings have been specified by leading manufacturers of cranes, shovels, graders, vibrating screens, and steel mill, paper mill and foundry equipment . . . and for high-precision applications such as embossing rolls, printing presses and torque converters.

SEE BOOK 2760 for further precision, durability and high-capacity features. Contact your nearest Link-Belt office or authorized stock-carrying distributor. Look under BEARINGS in the Yellow Pages of your phone book.

LINK-BELT

SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,001



A message from G. Washington

On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

This mark tells you a product is made of modern, dependable Steel.

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

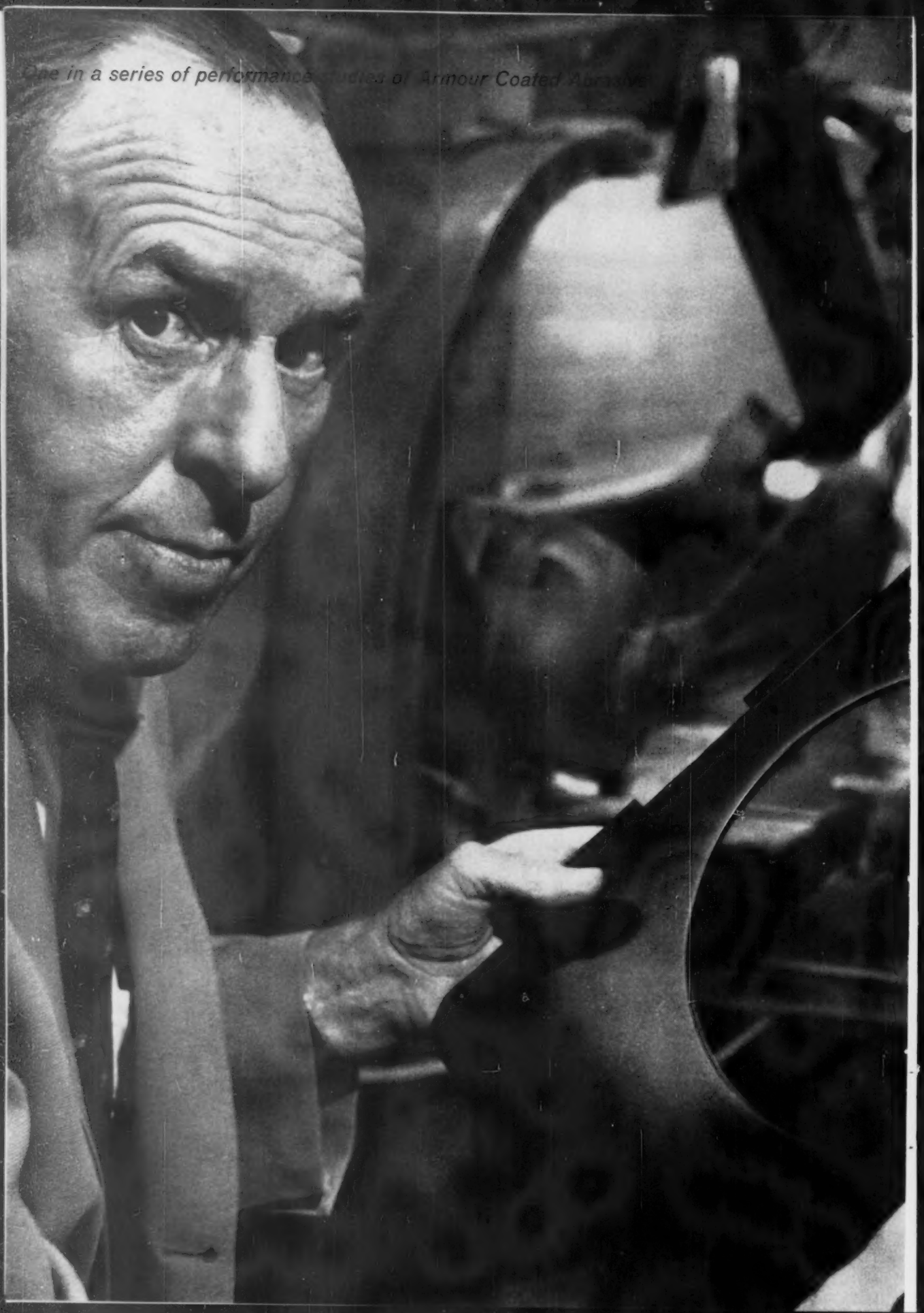
Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear

of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS and National are registered trademarks*

National Tube
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York


One in a series of performance studies of Armour Coated Abrasives

ARMOUR coated abrasives work for Foxboro

...exceed performance standards by 25%

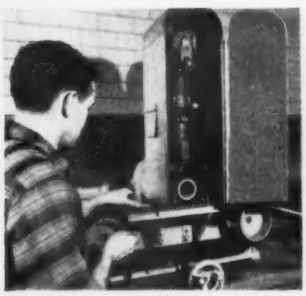
"We have used Armour coated abrasive belts exclusively for seven years because our own annual tests prove that they give far better service in every application," says Mr. Harold Twigg, finishing department superintendent, The Foxboro Company, Foxboro, Massachusetts.

"An example is the polishing of the doors of this instrument case. In our production run tests this year, our standard was 180 pieces per belt on the first rough cut. The Armour belt polished 225 pieces. Another example is the finish cut. Our standard is 100 pieces per belt. The Armour belt polished 125," he reports.

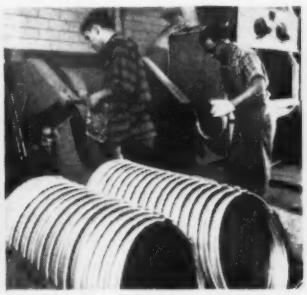
Production standards at Foxboro are the result of years of accumulated experience. And, like other leading manufacturers throughout industry, Foxboro's experience leads them to choose Armour Coated Abrasives for extra performance.

How long has it been since you've tested Armour Coated Abrasives? Our standing offer is—put Armour to work on your toughest, most demanding job. Then look at the improved results—more production, higher quality, less cost.

There is an Armour Coated Abrasive distributor near you. He's ready and willing to meet your most strict requirements. And he's backed by Armour technical help and more than sixty years' growth in coated abrasives technology. If you'd like a detailed technical report on The Foxboro Company's experience, write for data sheet M-100, Armour Alliance Industries, Coated Abrasives Division, Alliance, Ohio.

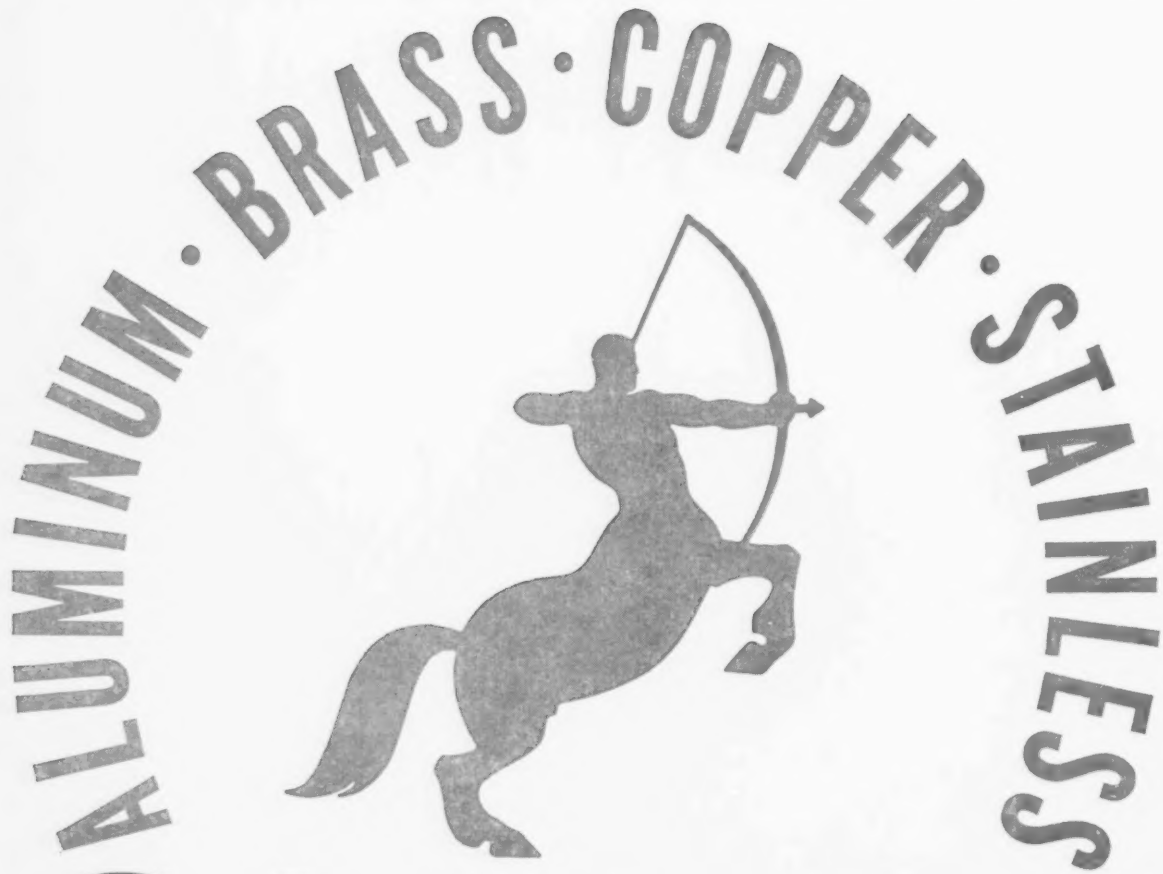


Precision "movement" parts are fed through grinder. Door normally closed is open to show Armour Abrasive belt. Armour Abrasives help The Foxboro Company maintain their standard "piano" finish of a fine concert grand.



Armour Coated Abrasives used in polishing die cast door and ring. Both are components of cases which protect precision Foxboro instruments against adverse conditions in chemical plants, paper mills and oil refineries.

the new Armour and Company



CHASE

CHASE BRASS &

Announcing

a new name for us...

a new service for you!

METALS SERVICE DIVISION

COPPER CO.

For over 40 years the name "Chase" has meant the biggest warehouse organization in the Copper Mill industry. In the past 7 years we have expanded our line to include Aluminum and Stainless and many specialties in these metals.

Now that we have enlarged our services and diversified our line, the name "Chase Brass & Copper Co.," is no longer appropriate for our warehouse business. Therefore, we have established the Chase Metals Service Division with its own sales organization to meet the growing requirements of industry and the changing needs of our customers.

Because we are warehouse specialists, keep us in mind for your metal requirements and call your nearest Chase Metals Service Division listed below.

THE NATION'S HEADQUARTERS FOR ALUMINUM, BRASS, COPPER & STAINLESS

ALUMINUM · BRASS · COPPER · STAINLESS

CHASE METALS SERVICE DIVISION

CHASE BRASS & COPPER CO., Waterbury 20, Conn.
Subsidiary of KENNECOTT COPPER CORPORATION

Atlanta	Cleveland	Kansas City, Mo.	New Orleans	Providence
Boston	Dallas	Los Angeles	New York	St. Louis
Chicago	Detroit	Milwaukee	Philadelphia	San Francisco
Cincinnati	Indianapolis	Minneapolis	Pittsburgh	Waterbury

From Norton... Higher Speeds for Faster Grinding ...Cylindrical or Surface

For your cylindrical grinding

. . . Norton brings you cylindrical grinders which provide a new higher wheel speed of 8500 SFPM. In test after test Norton Machines using "high-speed" Norton wheels have proved their ability to operate at this new high speed — safely, steadily and with production advantages never obtained before.

These Norton cylindrical production grinders — now called the Series 8500, and so identified with a name plate — include the Type CTU Cylindricals, Angular Wheel-Slide grinders, No. 2 Centerless and the Type CP-1 PLUNG-O-MATIC®. Similarly, Norton high-speed wheels have been tested and approved for 8500 SFPM and carry the new checkered-flag stencil.

Remember: *it took a great deal more than stepping up spindle speeds to assure the greater productivity of Series 8500 machines.*

Fluctuations in wheel energy, mechanical energy, tangential force and many other factors had to be carefully considered before final approval of designs.

As a result, Series 8500 grinders produce more pieces-per-hour at lower cost-per-piece . . . provide finer finishes for improved product quality . . . and their higher speed reduces wheel dressings for longer wheel life and lowered wheel cost.

For your surface grinding

. . . Norton Type S-3 hydraulic surface grinders are now available with table speeds stepped up to a new high of 150 FPM.

This is another Norton achievement to bring you faster production than ever before. And, like the Series 8500, the Type S-3's are engineered to provide better production and product quality as a benefit of higher table speed.

Available in 6″ x 18″ and 8″ x 24″ sizes, Type S-3 surface grinders are fast and accurate on long production runs or toolroom grinding. They handle taller workpieces . . . are equipped for fast positioning, better sighting and loading . . . and their faster table speeds mean less heat damage to workpieces.

Only Norton provides 150 FPM table speeds on surface grinders.

Learn how Norton developments are bringing more and more advantages of the speed age to many types of grinding. And call your Norton Man — a trained Grinding Engineer — for details on how these advantages can be brought to your own production. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Massachusetts.

District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 18.

NORTON
MACHINE TOOLS

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines

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DENISON HydrOILics

How **AUTOMATIC ELECTRIC** assembles critical phone parts on **DENISON** Multipress via high precision...

SPINNING

HIGH PRECISION SPINNING *required for final assembly of delicate telephone receiver parts is done within specified tolerance of .001" on this Series "R" Denison Multipress in new Clean Room at Automatic Electric, Northlake, Ill. Write for free Bulletin 324–new "R-S-T" Series Multipress.*

FINAL ASSEMBLY of the vital operating components in Automatic Electric's new type 810 telephone receiver calls for an ultra-clean assembly area . . . *plus precision presswork to tolerances of .001".*

This Denison hydraulic Multipress is one of three Series "R" 8-ton Multipresses installed by Automatic Electric to handle key assembly operations in their new Clean Room.

Equipped with a special spinning die, this Multipress spins the telephone receiver shell-terminal board assembly to a frame-retaining ring assembly . . . joins these fragile parts in an airtight seal against dirt and moisture. Smooth, precisely controlled hydraulic ram pressure—an inherent performance feature of *every* Multipress—permits a positive, hermetically sealed closure with no damage to the delicate receiver components.

Do you have a pressing problem? Ask your nearby Denison Production Specialist about a **M**ultipress **A**nalysis **P**rogram in your plant. He'll help you **MAP** new ways to cut time and costs... improve quality on your toughest production jobs.

DENISON ENGINEERING DIVISION
American Brake Shoe Co.
1242 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

Where razor-sharp steel cut belt life short

THOSE razor-sharp slivers have just been sheared from a coil of steel and dumped on the conveyor belt. The scrap is not only sharp, it's also drenched in oil. A combination that was wrecking conveyor belts in only three or four months.

When a B.F.Goodrich distributor heard of the problem, he recommended a belt made of Koroseal vinyl. This B.F.Goodrich belt resists scuffing, tearing, cutting. It stands oil, grease, most acids and just about everything else that ruins other belts. It can be vulcanized into a continuous belt, eliminating troublesome fasteners, the weak spot in most belts.

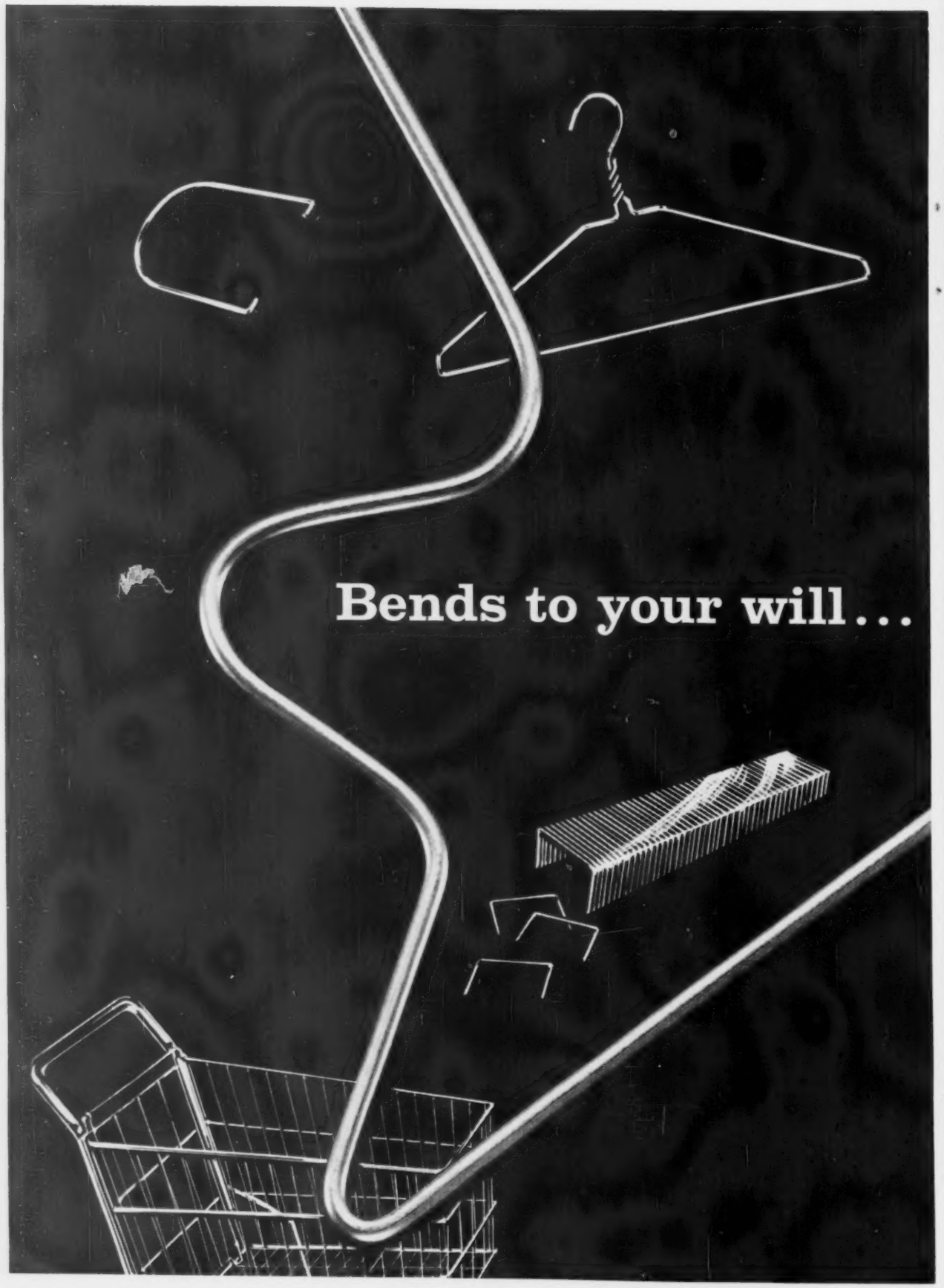
Scrap handling costs cut 75%

A Koroseal belt was installed, and has been in service a little over a year now. It's defied the oil and stood the cuts and scratches of sharp-edged steel so well that company engineers predict it will be good for at least another six to nine months. Cost of handling the scrap has been cut 75%!

If you have a similar problem that a Koroseal belt might solve, talk to your B.F.Goodrich distributor. He has exact specifications on the installation described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-153, Akron 18, Ohio.*

Koroseal—T.M.Reg. U.S. Pat. Off.

CONVEYOR BELTS BY B.F.Goodrich


Bends to your will...

CF&I Manufacturers Wire

If you want wire that forms easily or if you have a wire-forming problem, CF&I low carbon manufacturers wire can provide the answer. For example, this wire has the **ductility** that means more efficient fabrication on multiple slide machines . . . the **easy weldability** that speeds production and boosts end-product quality. It's available in sizes ranging from .500 inch to .0348 inch*, in both low carbon and medium carbon steel, and in a variety of finishes and tempers. Here are some typical examples of manufacturers wire produced by CF&I:

- Bag Tie Wire
- Basket Handle Wire
- Box Binding Wire
- Brush Handle Wire
- "Cal-Tie" Wire
- Can Key Wire
- Chain Wire
- Clamp Wire
- Clothes Pin Wire
- Cold Rolling Quality Wire
- Concrete Wire Accessories
- Garment Hanger Wire
- Hay Baling Wire (Coiled)
- Heading or Forging Quality Wire
- Industrial Quality Wire
- Medium High Carbon Wire
- Merchant Quality Wire
- Pail Bail Wire
- Rivet Wire
- Roll Threading Quality Wire
- Stapling Wire
- Strand Wire
- Tying Wire
- Welding Wire
- Wissco Iron Wire

CF&I engineers will be happy to consult with you concerning your wire-forming problems and recommend exactly the type, grade and finish of wire that's best for your operation.

In addition, CF&I Wire is "packaged for your production" in special packages to increase the efficiency and economy of your operation. For complete details and prompt service, contact your nearby CF&I sales office today. 8498

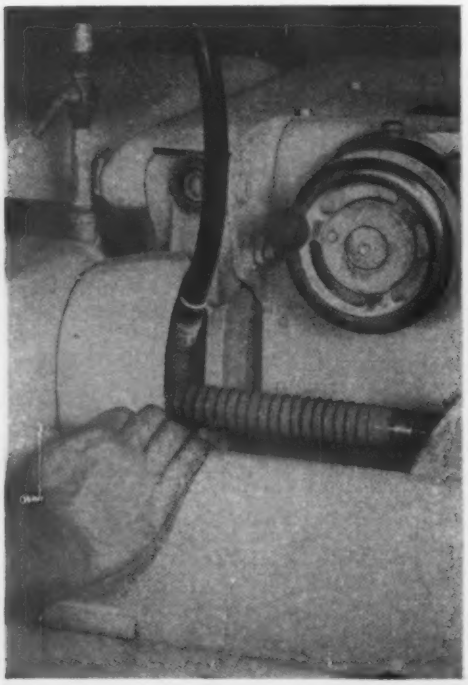
*Available in the West in size ranges from .625 to .0348

Steel means strength, beauty, economy.

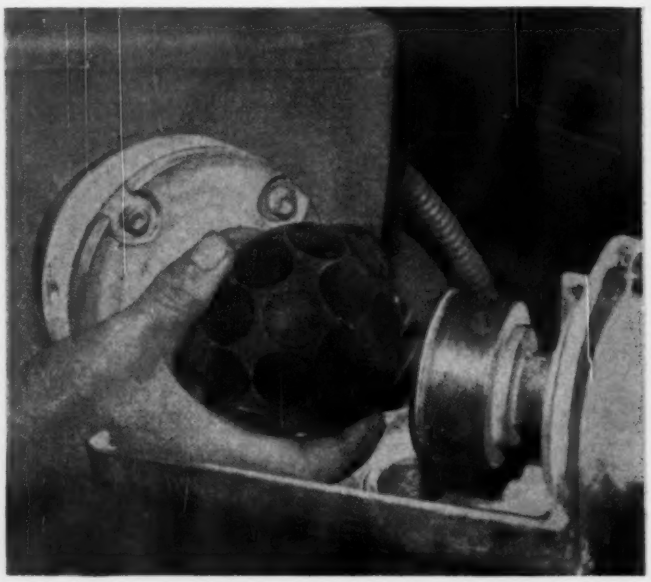
The Colorado Fuel and Iron Corporation
Denver · Oakland · New York
Sales Offices in Key Cities

CF&I STEEL MADE IN U.S.A.

Diamonite® Products Mfg. Co., Shreve, Ohio, gang-grinds ceramic rings with natural diamond wheel. The unchanging dimension of the wheel assures uniformity of diameter and surface finish. Only diamonds can give the finish required to meet specified tolerances.



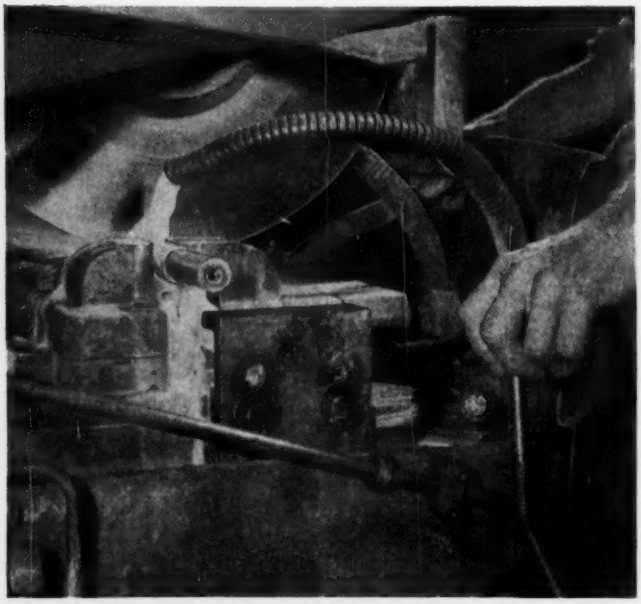
Bell & Howell, Chicago, grinds 13 lenses simultaneously with natural diamonds. Cup-type metal-bond wheel is impregnated with 160-mesh natural diamond particles. Bell & Howell also uses natural diamonds to polish precision parts for their new "zoom" camera mechanism.



These manufacturers are using natural diamonds to advantage. You can, too.

Industrial diamonds cut practically everything . . . especially your production costs

National Vulcanized Fiber Company, Wilmington, Delaware, cuts glass-reinforced plastic tubing with diamond cut-off wheel. Metal-bond diamond wheel withstands heavy abrasion of glass reinforcement, and leaves a clean, smooth edge without causing delaminations.



Kandu Tool Company, New Haven, Connecticut, grinds carbide gun drills, used to drill deep holes in steel, with natural diamond resinoid-bond wheel. In this operation, .015" of material is removed in a plunge cut. Only natural diamonds can withstand the impact of the interrupted cut.

The four grinding and polishing jobs shown here span the fields of optics, metalworking and ceramics. But they have one important thing in common: in every case, natural diamonds are doing the job quickly—and economically.

In diamonds, you find this unique combination of properties: excellent cutting ability linked with fantastic endurance.

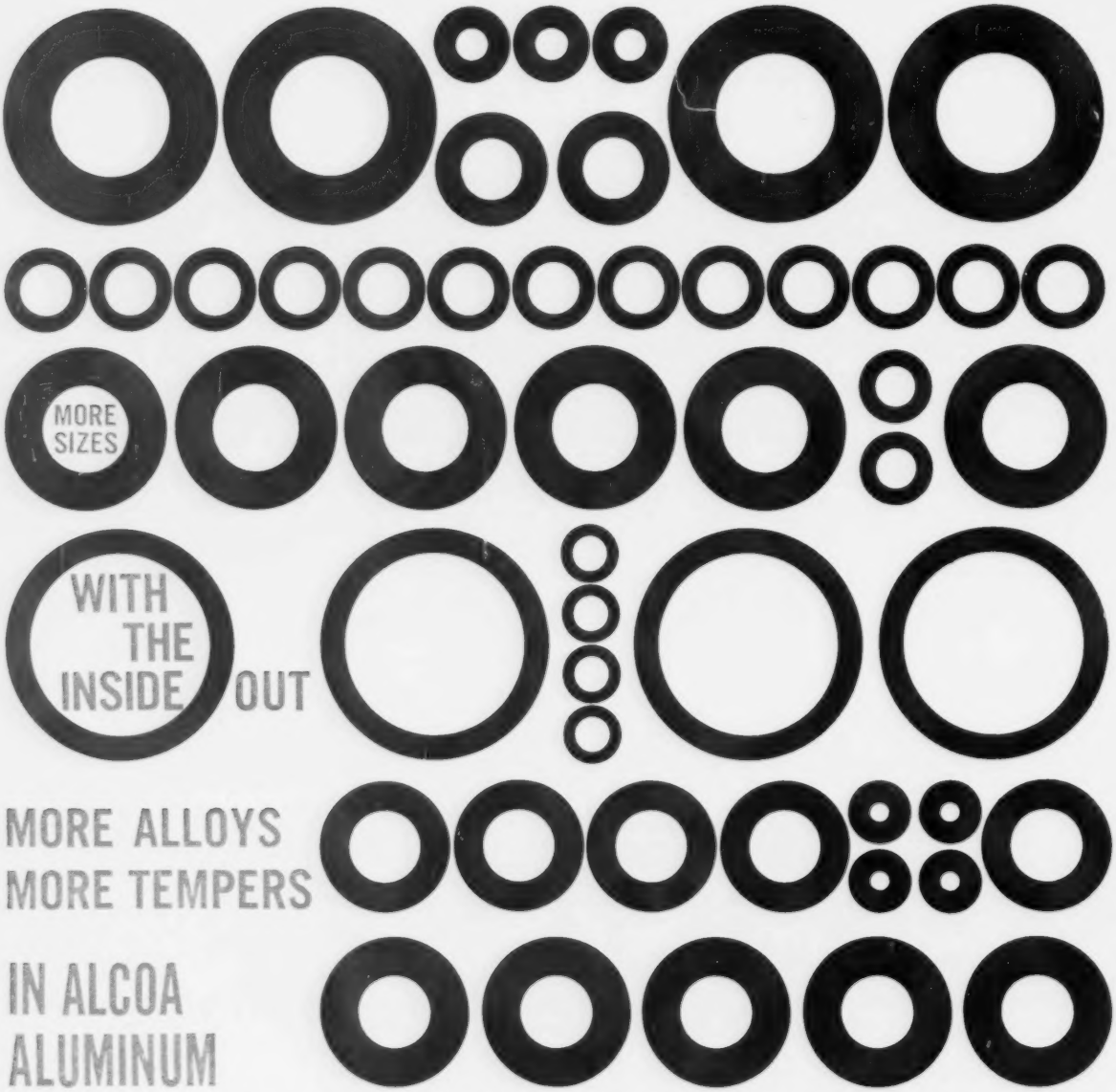
Result: your diamond tools last longer than any other tools you can use. Your people spend more time producing, less time changing tools.

If you cut, sharpen or smooth in your business, you can probably use natural diamonds to advantage. Test them against the method you're now using. You'll see how efficient—and economical—a diamond can be, especially now.

BEST GRIT FOR METAL-BOND WHEELS DEVELOPED BY THE DIAMOND RESEARCH LABORATORY IN JOHANNESBURG

A new impact crushing method for natural diamonds is now producing the strongest and most durable diamond grit ever obtained for metal-bond wheels. Your tool and wheel manufacturer is ready to help you select the diamond tool that's right for your job.

Industrial Distributors (Sales), Ltd.
World's leading supplier of diamonds for industry



You can reduce machining time, increase tool life, cut scrap and chip-handling costs drastically on *more* products. Alcoa® Aluminum Hollow Screw Machine Stock and Mechanical Tube come in the industry's broadest size ranges.

Alcoa Aluminum Hollow Screw Machine Stock is available in five alloys: 2011-T3, 2011-T4511, 2017-T4511, 6262-T9 and 6262-T6511—and 6262 costs *less than any comparable product*. OD's from 1 to 4 in.; wall thicknesses from $\frac{3}{16}$ to $\frac{1}{2}$ in.

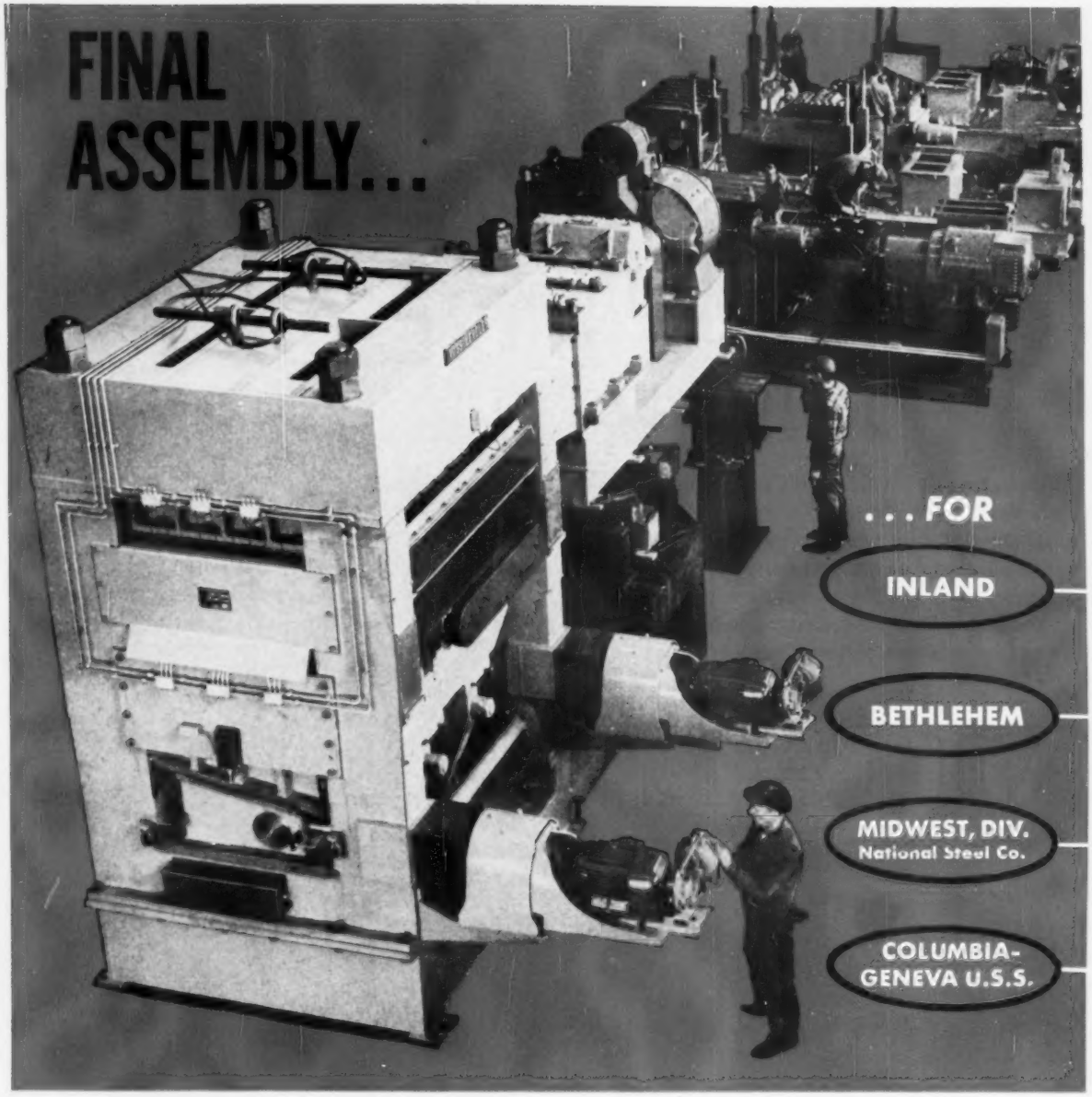
Alcoa Aluminum Mechanical Tube comes in three alloys: 2024-T4, 6061-T6 and 7075-T6—competitively priced, but made to *closer tolerances* than any competitive product. OD's from $1\frac{1}{4}$ to $2\frac{1}{4}$ in., 6061-T6 only; $2\frac{1}{4}$ to 12 in. in all three alloys. Wall thicknesses from $\frac{1}{8}$ to 1 in.

Call your local Alcoa distributor or Alcoa sales office and order now. Also, ask for your free copies of *The Hole Story About Machining Hollow Parts More Economically* and the new *Aloca Aluminum Screw Machine Stock Handbook*, or write: Aluminum Company of America, 855-MM Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

SCREW MACHINE STOCK

Entertainment at Its Best
ALCOA PREMIERE
with Fred Astaire as Host
Tuesday Evenings, **ABC-TV**



These 4 Voss Inverted Roller Levelers are in final assembly. Soon they'll be at work in varied applications ranging from galvanized and hot and cold rolled to plate and high yield missile stock. Each of these companies, already a user of Voss Levelers, know they obtain precise area control and equal to or better than stretcher leveler flatness at high production speeds. Let Voss put 30 years of leveling and flattening experience to work for you.

Call or write today! We'll be glad to arrange a demonstration without obligation.

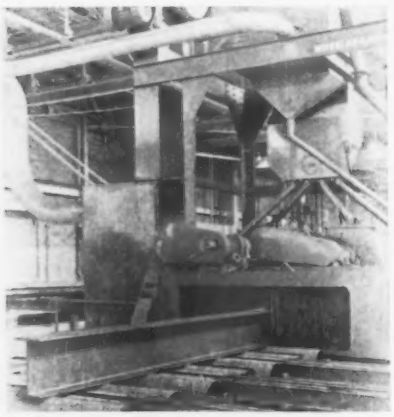
Voss ENGINEERING CO.

7301 Penn Ave. Pittsburgh 8, Pa. Churchill 2-4422

Wheelabrator® blast cleaning cuts costs for structural fabricators

Airless abrasive blast cleaning of structural steel to "white metal" before fabrication is a proven cost-cutting step. Many leading fabricators are now Wheelabrator cleaning all their steel prior to fabrication, and getting the advantages of more rapid and positive inspection, reduced layout time, faster, better welding and flame cutting, and greatly reduced housekeeping costs. Such fabrication cost savings more than repay the $1.50 to $2.00 per ton cleaning cost. Equally important, the end product is improved. Wheelabrator-cleaned steel takes a better, longer-lasting finish, reducing maintenance costs on the finished structure. Such multiple benefits and savings are another example of how Wheelabrator delivers the

VITAL VALUES



The Wheelabrator in this structural fabricating plant handles all shapes and plate, including I-beams and angles, in lengths up to 60'.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR

AIRLESS BLAST EQUIPMENT

WHEELABRATOR CORPORATION, 510 S. Byrkit St., Mishawaka, Indiana, In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario

A subsidiary of Bell Intercontinental Corp.

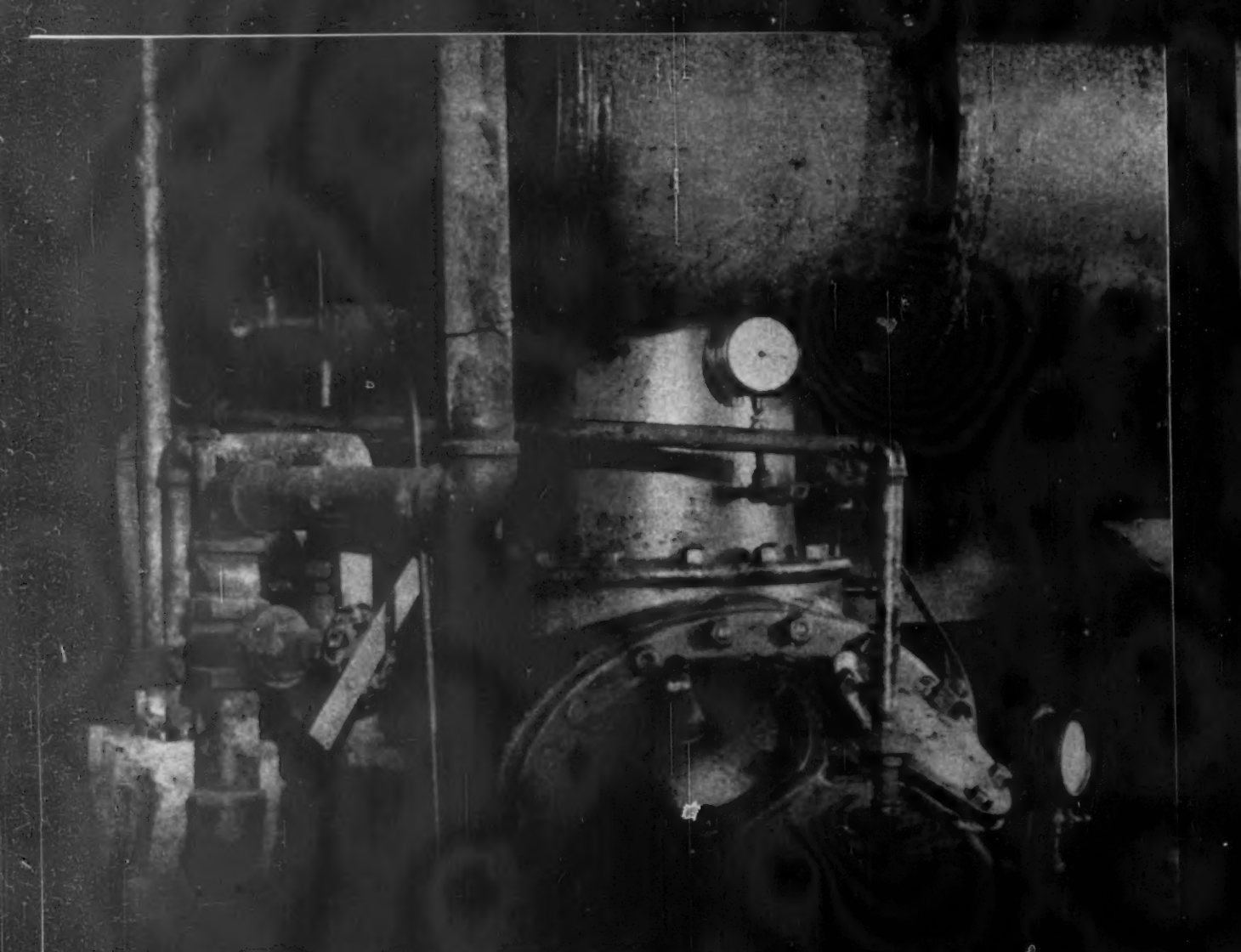
NU-ERA MANUFACTURING COMPANY, New Bedford, Mass.

Cities Service fits right in with their plans!

There's a bright future ahead for Nu-Era, manufacturer of replacement gears. The firm recently built this huge plant to handle increased orders... and Cities Service definitely fits in with their plans. Says General Manager Bill Rebone, "At first, all cutting oil brands seemed to be the same. However, we soon realized that Cities Service oils were giving us superior performance in every respect. Most of our gears are made of #5135 steel, a real tough customer to work with. Yet, we find we're getting long tool life, extra clean cuts with Cities Service Chillo 30 Cutting Oil." Nu-Era now relies, exclusively, on Cities Service for their metal machining fluids. Find out how Cities Service can fit in with your plans. Simply contact your nearest Cities Service office or write: Cities Service Oil Company, 60 Wall Street, N.Y. 5, N.Y.

CITIES SERVICE

Out Front in Quality... Out Front in Service, too!



How Wheeling Steel bought safety... gained efficiency with Cellulube 300

Mr. Kenneth N. Bundy, Superintendent of Utilities Department, Steubenville Works, Wheeling Steel Corporation is responsible for the safe and efficient operation of power house equipment. Air compressor lubricant is fire resistant Cellulube 300.

Two of three 100 psi. air compressors in power house at Wheeling Steel. Not a single air compressor fire has occurred at this installation since Celanese fire-resistant Cellulube 300 has been used as the lubricant.

Compressor fires were troublesome before Celanese Cellulube was used in three dual stage, 100 psi. air compressors in the power house of Wheeling Steel's Steubenville Works.

To stop this fire problem, Celanese recommended Cellulube 300. And, since use of this fire-resistant fluid was initiated more than five years ago, there has not been a single fire in any of the compressors! What's more, substantial savings have been gained through reduction in maintenance.

Celanese Cellulubes, available in six controlled viscosities, prevent build-up of hard car-

bon deposits. Cleaner operation eliminates the need for cleaning compressor auxiliaries and greatly reduces frequency of valve cleaning.

Cellulubes give overall protection against wear comparable to that of premium petroleum oils.

Doesn't it make sense to investigate what fire-resistant Cellulubes can do for you in terms of both safety and efficiency? The coupon will bring you complete details. Celanese Chemical Company, 522 Fifth Avenue, New York 36, N. Y.

Celanese® Cellulube®

Celanese Chemical Company is a Division of Celanese Corporation of America
Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver
Export Sales: Amcel Co. Inc., and Pan Amcel Co., Inc., 522 Fifth Avenue, New York 36

Celanese
CHEMICAL COMPANY

CELANESE CHEMICAL COMPANY
Dept. 578-L, 522 Fifth Avenue, New York 36, N. Y.

Rush data on Cellulubes.

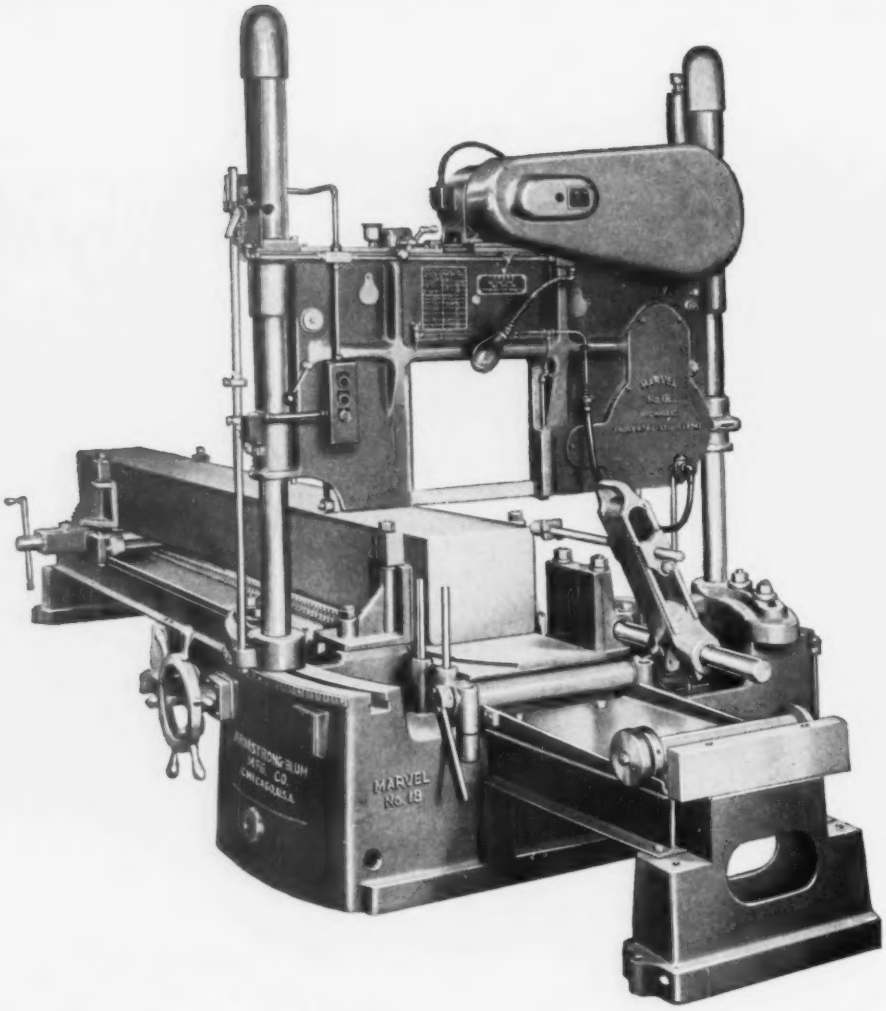
Name_____

Company_____

Address_____

City_____ Zone_____ State_____

My application for Cellulubes is_____



No Job too big or too tough . . .

for MARVEL "*Giant*" Hack Saws

These giant MARVEL Hydraulic Hack Saws (No. 18, Capacity 18" x 18"; and No. 24, Capacity 24" x 24") were *basically* designed for rapid and economical cut-off of BIG WORK. They are not merely "conventional" designs "stretched" to big capacity. They are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

They are reliably fulfilling the cut-off requirements in innumerable steel mills, forge shops, structural shops, warehouses, and machine shops, with assured low tool cost and minimum kerf loss of steel.

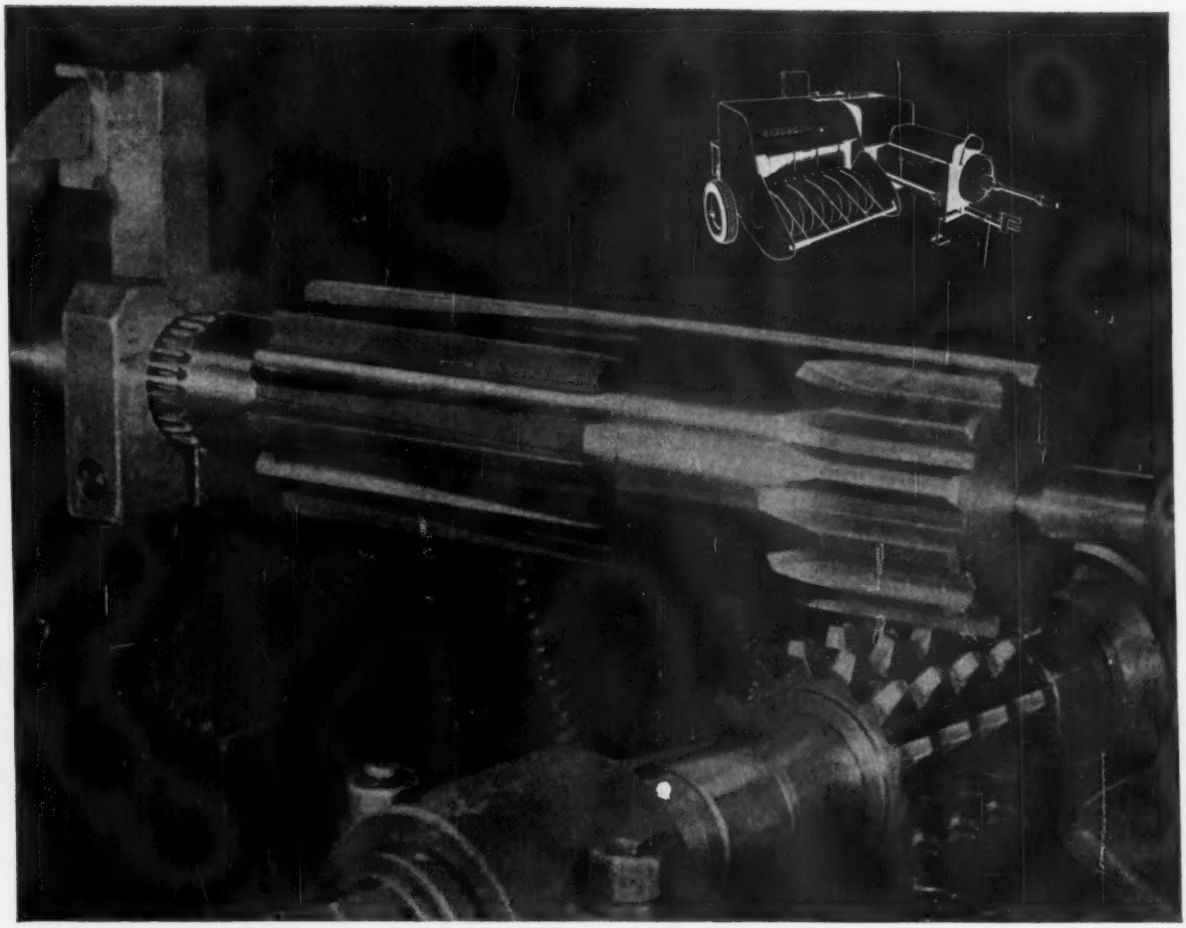
In addition to cutting-off, they are reducing costs by eliminating further machining operations. Heat treated die blocks are being reclaimed for re-sinking by sawing off the worn face; columns, beams, pipe, and tubing are being sawed to *finished*, square ends, eliminating milling; angular sawing is done conveniently by swinging the upper structure on the base, to any angle up to 45 degrees—*without moving the work.*

Contemplating the modern trend toward ever tougher steels and larger sizes, these are the logical sawing machines to buy, not only for today's needs but for tomorrow's as well.

Write for Catalog

MARVEL *Metal Cutting* SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.



Oliver Corporation

cuts machining costs 40%

on main drive shaft for baler with STRESSPROOF STEEL BARS

"We get greatly improved machinability when we use Stressproof steel bars instead of 4140 alloy," says Mr. Carl H. Frailey, purchasing agent for Oliver at Shelbyville, Illinois. Here's how:

"33% Faster 'blanking out' on the tracer lathe."

"50% Less dressing of grinding wheels."

"$3,000 Savings on cutters . . . we now spline 40 pieces for every cutter setting, compared with 12 pieces using 4140. This means only two $500 cutters a season instead of two a month."

Write for a sample test bar and see how Stressproof can reduce your cost per part. Get strength (100,000 psi yield) without heat treating, plus . . . wearability . . . minimum warpage . . . fast machining.

Use this coupon to ask for Helpful Data Bulletins

☐ No. 15, Stressproof

Need still higher strength?...ask for one of the following bulletins:

☐ No. 10, Fatigue-proof® bars (125,000 psi yield)

☐ No. 22, "e.t.d.®" 150 alloy steel bars (130,000 psi yield)

☐ No. 23, "e.t.d.®" 180 alloy steel bars (165,000 psi yield)

name_____ title_____

company_____

address_____

city_____ zone____ state_____

La Salle STEEL CO. | 1436 150th Street Hammond, Indiana

Here's how to contact such a man

Your Product Design Committee should include an extruder

WITH THE HELP of quickly available extrusion specialists, more and more companies have discovered that they can now save substantially by replacing rolled, crimped, welded, machined and assembled parts with low-cost aluminum extrusions.

Have a nearby independent extruder analyze your own product line right away. And consult him regularly from now on. The chances are excellent that with his specialized up-to-date knowledge of extrusions he can help you make major savings.

A helpful product analysis is just one reason, however, for calling on an independent extruder. *Fast service* is another. He's at hand when you need him. Your order is important to him. And it doesn't have to wait for hundreds of others.

Quality is equally important. Your nearby extruder offers the consistent quality of a specialist—the consistent quality of a supplier who takes a personal interest in your business.

It's good business to know your nearby independent extruder . . . a specialist supplied with top-quality aluminum ingot by Aluminium Limited.

Supplying metal and ideas to companies that work with aluminum

ALUMINIUM LIMITED

Aluminium Limited Sales, Inc., 111 W. 50th St., New York 20, N. Y.

ALCAN

MAIL THIS COUPON FOR EXTRUDER NAMES AND ADDRESSES:

ALCAN

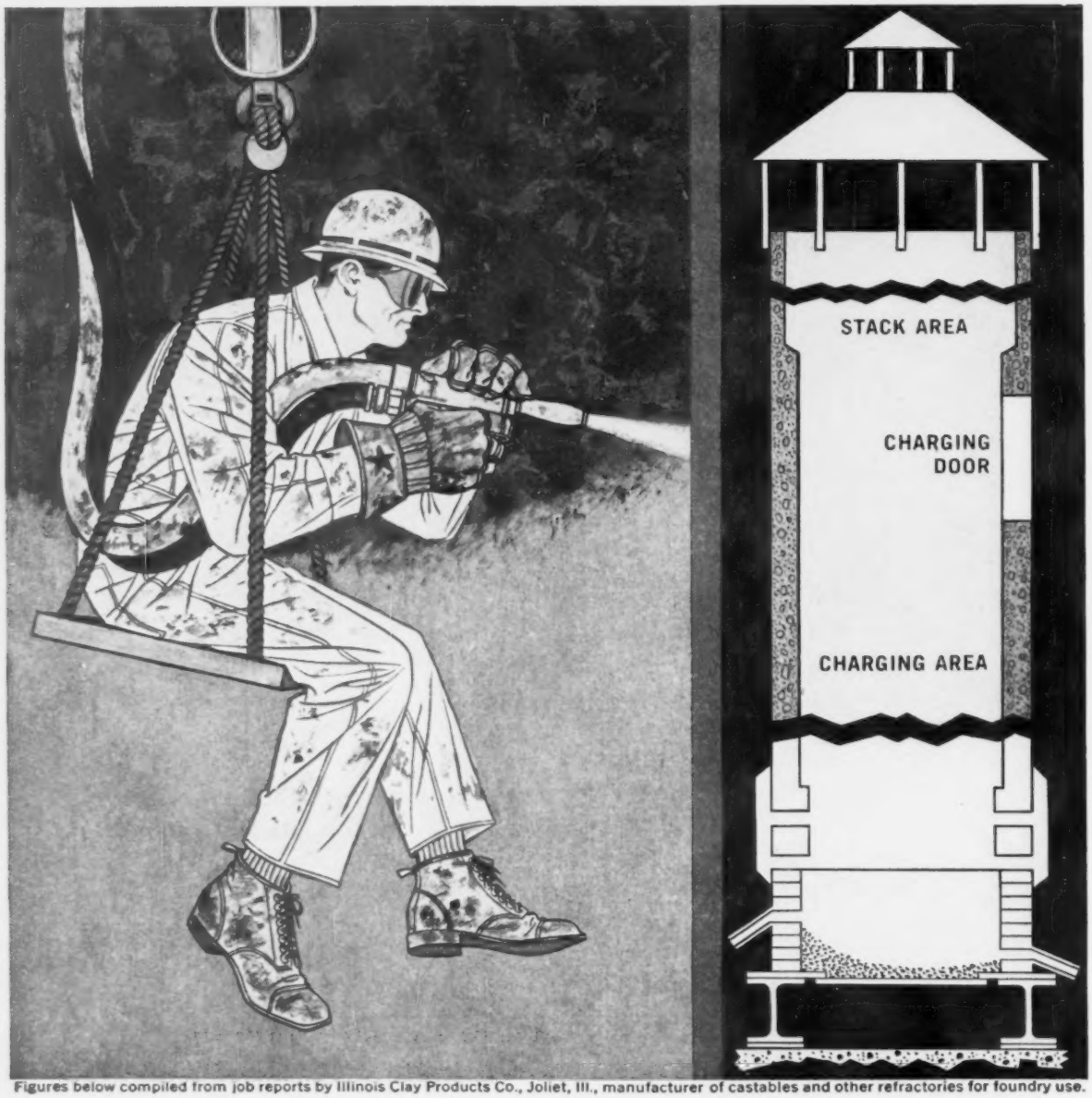
Aluminium Limited Sales, Inc., 111 W. 50th St., New York 20, N. Y., Dept. I-1214
Please send me a list of Independent Extruders in this area.

Name_____ Title_____

Company_____ Address_____

City_____ Zone_____ State_____

Line cupolas, by gun, with monolithic refractory castables!



Figures below compiled from job reports by Illinois Clay Products Co., Joliet, Ill., manufacturer of castables and other refractories for foundry use.

Foundries that use castables made with LUMNITE calcium-aluminate cement to line cupolas have cut installation time 75%, reduced refractory costs 43%, and increased lining life 78%.

Gun-applied castables in the charging zone and upper stack of cupolas form a strong, joint-free lining that offers greater resistance to erosion. The concrete lining may be gunned to any thickness, actually helps reinforce the shell, reaches full strength in 24 hours.

Castables for cupola linings are available from leading manufacturers of refractories. For details on the use of LUMNITE cement, write Universal Atlas, 100 Park Avenue, New York 17, N. Y.

Universal Atlas Cement
Division of
United States Steel

"USS" AND "LUMNITE" ARE REGISTERED TRADEMARKS. L-214

OFFICES: Albany • Birmingham • Boston • Chicago • Dayton • Kansas City • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh • St. Louis • Waco

WE'RE PUTTING OUR MONEY WHERE OUR MOUTH IS!

WITH A 90-DAY
MONEY-BACK
GUARANTEE
ON THE
NEW
PRATT & WHITNEY
TAPE-O-MATIC DRILL

$8,595

1½ HP. Big 30" x 20" table.
Simultaneous positioning of both axes.
(3 HP. optional at extra cost.)

NOW! FOR THE FIRST TIME A NUMERICALLY CONTROLLED DRILL FOR ONLY $8,595 GUARANTEED TO REDUCE YOUR DRILLING COSTS

At last . . . a drill with the finest, transistorized, numerical-control system available for only $8,595 . . . because P&W brings mass production to the machine tool industry for the first time . . . yet maintains the 100-year tradition of P&W quality.

The TAPE-O-MATIC enables **you** to benefit from numerical control . . . to gain a vitally-needed, important competitive edge.

WE BELIEVE IN THIS NEW DRILL SO STRONGLY THAT WE OFFER:

1 90-DAY, MONEY-BACK GUARANTEE. If by 90 days after purchase, this drill has not reduced your drilling costs, return it for refund, less transportation costs.

2 5-YEAR WARRANTY. We fully warrant the TAPE-O-MATIC drill against defective parts and workmanship for 5 years from date of purchase.

3 UNIQUE TERMS. You can buy TAPE-O-MATIC using our exclusive Trade-in Plan. You can purchase the drill outright, lease it, or lease it with option to buy. ONE PER CENT CASH DISCOUNT FOR PAYMENT IN 10 DAYS.

Call collect . . . your local Pratt & Whitney representative, now! Or write to: Paul N. Stanton, Vice President Marketing; Pratt & Whitney Co., Inc.; Charter Oak Blvd.; West Hartford, Conn.

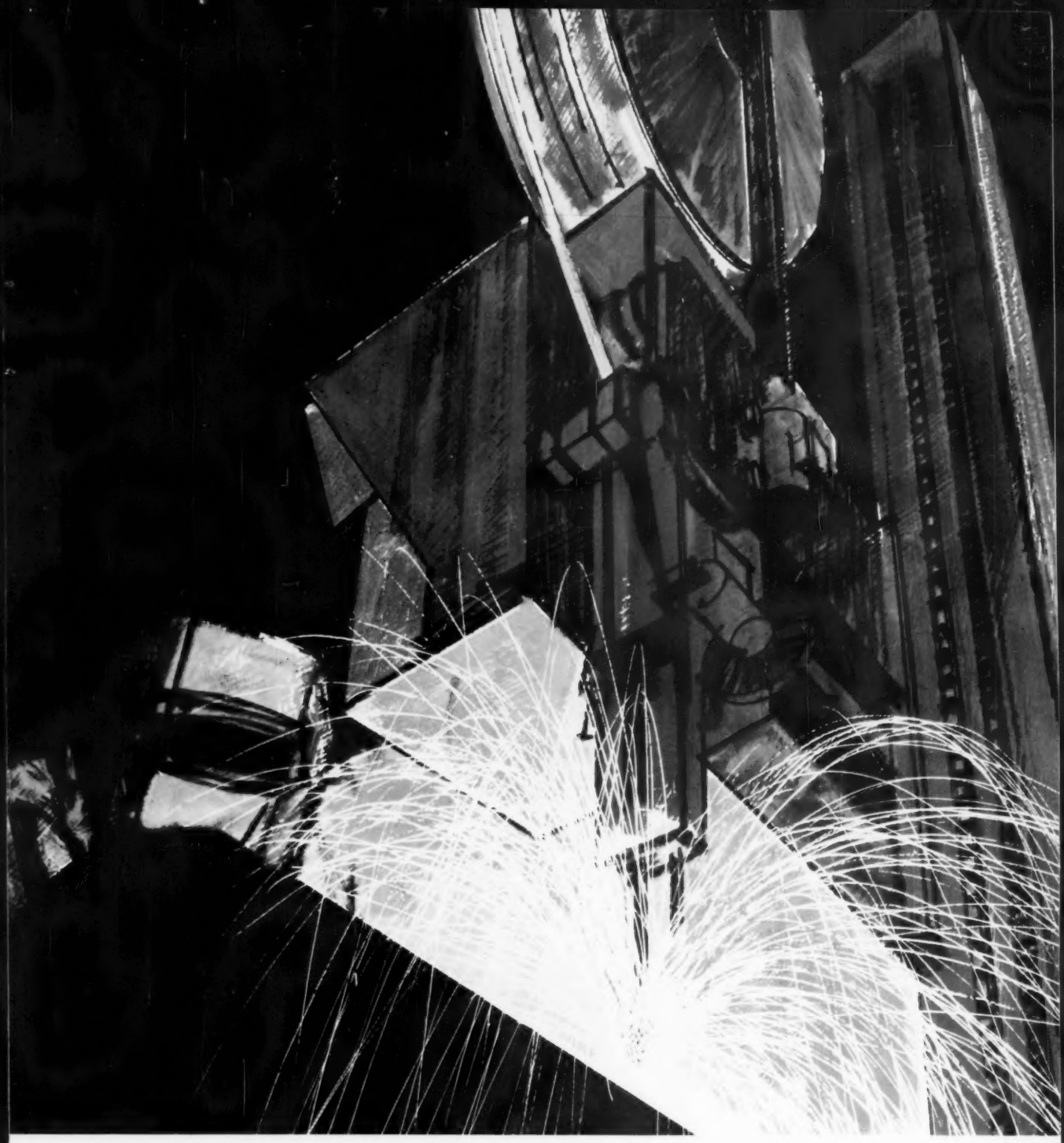
PRATT & WHITNEY
A MAJOR INDUSTRIAL COMPONENT OF
FAIRBANKS WHITNEY
Machine Tools / Cutting Tools / Gages

HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

Free your roll shops for redressing and leave the finishing to us

Is roll finishing straining the profitability of your roll shop operations? Many roll users have lowered operating costs by ordering finished rolls from National, leaving their shop facilities for redressing. They've found National's modern, fully equipped roll shop economically meets all requirements for precision finishing of plain or grooved rolls. They know experienced men such as sales representatives John Patton and Bill Mason, pictured above, shoulder the responsibility for roll quality from "spec" to finishing. On your next order for steel, iron or nodular iron rolls order them finished by National. You'll see why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

NATIONAL ROLL & FOUNDRY DIVISION
GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
General Steel Industries, Inc., General Offices: Granite City, Ill. Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.
Subsidiary: St. Louis Car Company, St. Louis, Mo.



New N-S Welding Wire...

National-Standard's new gas cleaned stainless steel welding wire provides the cleanest surface, highest operating efficiency for automatic inert gas and submerged arc welding. One and twenty-five pound spools and three foot cut lengths. Standard grades and sizes. Sold by leading distributors, or you can order direct from National-Standard.

NS
NATIONAL STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Niles, Michigan

These sound castings made sound products

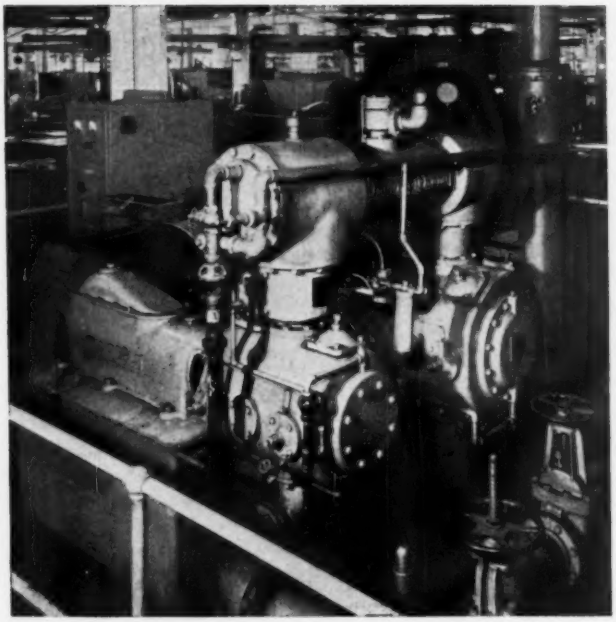
Gray and alloyed iron castings are continually being called upon to do more exacting jobs. Parts are now designed and cast to meet strength and weight standards precisely. Over-design or "rule-of-thumb" casting procedures mean penalties in weight, size or cost. Under-design or casual production controls reduce quality and dependability of the end product.

These castings were engineered to specifications at The Decatur Casting Company where high quality standards govern every step of the production process. Heat treating, when required, was done in our own furnace. The customers ordered castings to specification—and got what they ordered in every casting.

Decatur Quality Castings® are supplied in weights from a few ounces to 100 pounds. We suggest you consult us on your next casting requirements.

THE DECATUR CASTING CO.

Light Gray Iron and Alloyed Iron Castings
Decatur, Indiana Phone: Decatur 3-2700



IN I-R COMPRESSORS,

TIME TELLS

THE DIFFERENCE

In this compressor, I-R Channel Valves have operated

13 YEARS

without maintenance or cleaning!

The 125-hp Ingersoll-Rand compressor shown above was installed in 1948 at the American Standard Industrial Division of American Radiator and Standard Sanitary Corporation, to provide 100-psi plant air power. Since that time, the compressor has operated from 12 to 24 hours a day, five or six days a week – and not a single valve part has been replaced, and the *valves never even had to be cleaned!* A couple of years ago the operator removed one valve from the machine for inspection, found it in perfect condition, and put it right back into the cylinder!

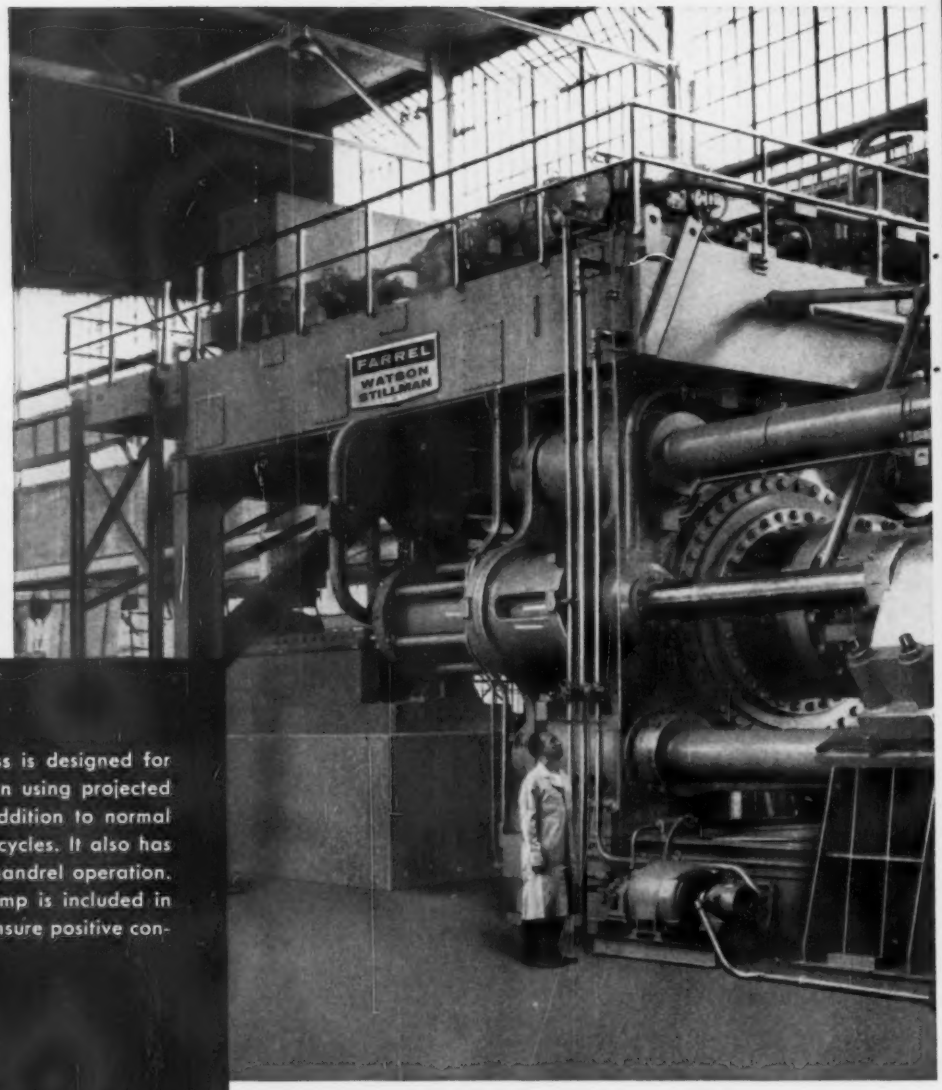
Ingersoll-Rand air-cushioned Channel Valves* have made many records like this. Ingersoll-Rand compressors now have many other *extra-value features*, such as full-floating aluminum bearings which never need adjustment, sealed frame which keeps out dirt (the major cause of wear), full filtered pressure lubrication, and self-adjusting metallic packing.

The extra value that's built into every type of Ingersoll-Rand compressor pays off with *long-run economy*. Reduced maintenance and attention, over many years, mean big savings in the cost of air power. I-R offers the most complete line of compressors—in reciprocating, centrifugal, axial-flow, rotary and thermal types. There are units from ½ to 25,000 hp, for pressures from one micron to 125,000 psi. Call your I-R man today for help on your job.

* **Only I-R compressors have Channel Valves**
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact. Separate stainless-steel seat plate may be turned over or replaced for new life.

Ingersoll-Rand
254A1 11 Broadway, New York 4, N.Y.

The World's Most Comprehensive Compressor Experience



The 4500-5000 ton press is designed for automatic cycle operation using projected "bridge-type" dies in addition to normal "solid" and "porthole" cycles. It also has an automatic cycle for mandrel operation. A separate 5000 psi pump is included in the hydraulic system to insure positive container sealing.

WORLD'S

self-contained,

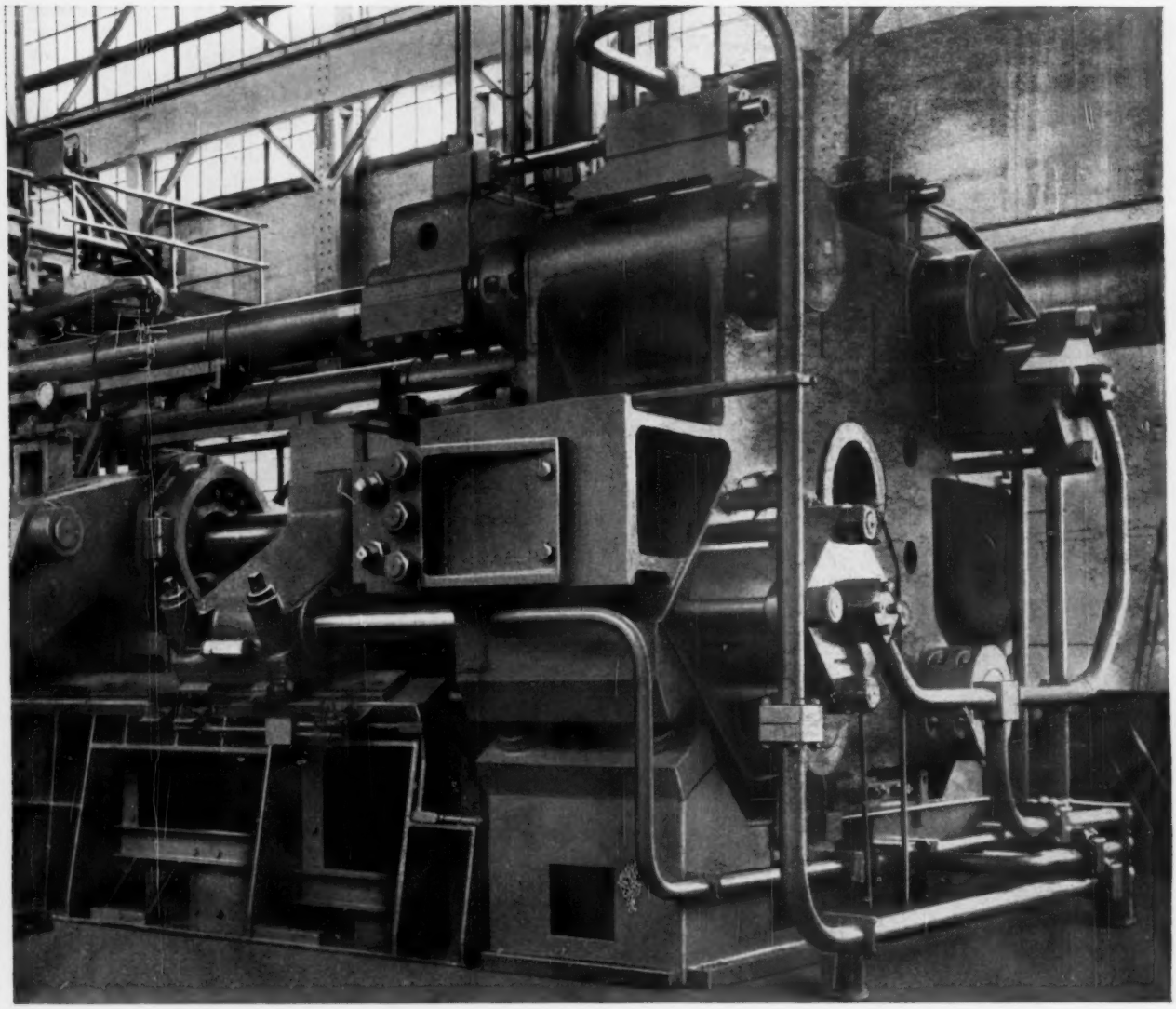
SPECIFICATIONS

Maximum billet size	18" x 42"
Cylinder pullback capacity	560 tons
Cylinder stripping capacity	950 tons @ 5000 psi
Sealing capacity	635 tons @ 5000 psi
Butt shear capacity	200 tons
Mandrel capacity	630 tons
Maximum extrusion speed @ 3600 tons	67" per min.

This 4500-5000 ton extrusion press is the largest of its type in the world. Designed and built by Farrel Watson-Stillman, it weighs more than 575 tons and, when equipped with the runout table, is 220′ long. It has an over-all height of 25′ 3″ and a width of 28′.

To be installed at the Richmond, Virginia, plant of Reynolds Metals Company, this press will increase their production potential to more than 3,000,000 lbs. of extruded products per month. These will include shapes up to 14″ diameter or width, such as aluminum light standards for expressways, sections for railroad cars and truck bodies, tubing, conduit and pipe, and wall panels for building construction.

The Reynolds press illustrates Farrel Watson-Stillman's capacity to build heavy equipment. It is the latest



LARGEST

hydraulic aluminum extrusion press

addition to the company's rapidly expanding line of extrusion presses which now range in capacities from 500 to 5000 tons and larger.

Consult Farrel Watson-Stillman on your next extrusion press. A staff of experienced engineers will work with you all the way on any "pressing" problem you may have, whether it involves a new plant installation or the expansion of your present facilities.

FARREL
WATSON
STILLMAN
®

FARREL-BIRMINGHAM COMPANY, INC.
WATSON-STILLMAN PRESS DIVISION

565 Blossom Road, Rochester 10, New York
Telephone: BUtler 8-4600
Also Manufactured Under License in Canada by
Canadian Vickers Limited

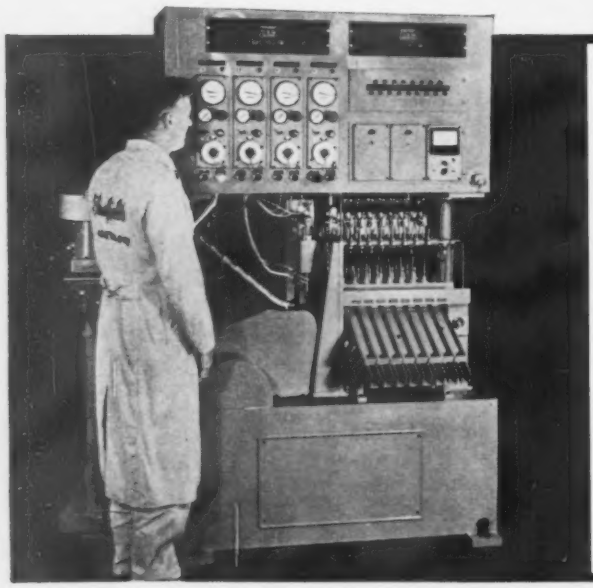
WS-88

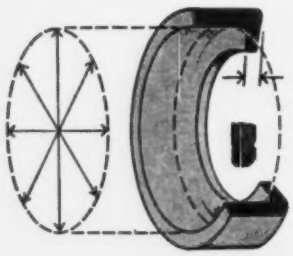
A **Sheffield sorter*** sorts 2000 rings an hour

2000 rings an hour a **Sheffield sorter*** sorts.

If a **Sheffield sorter*** sorts 2000 rings an hour

Where are the 2000 rings the **Sheffield sorter*** sorts?





*This Sheffield automatic gaging, classifying and segregating machine inspects up to 2,000 rings an hour for the Western Electric Company. It simultaneously measures inside diameter and flange thickness, classifies rings into 15 sizes plus out of tolerance, and rejects each size in its chute. Its speed and accuracy have resulted in appreciable manufacturing savings.

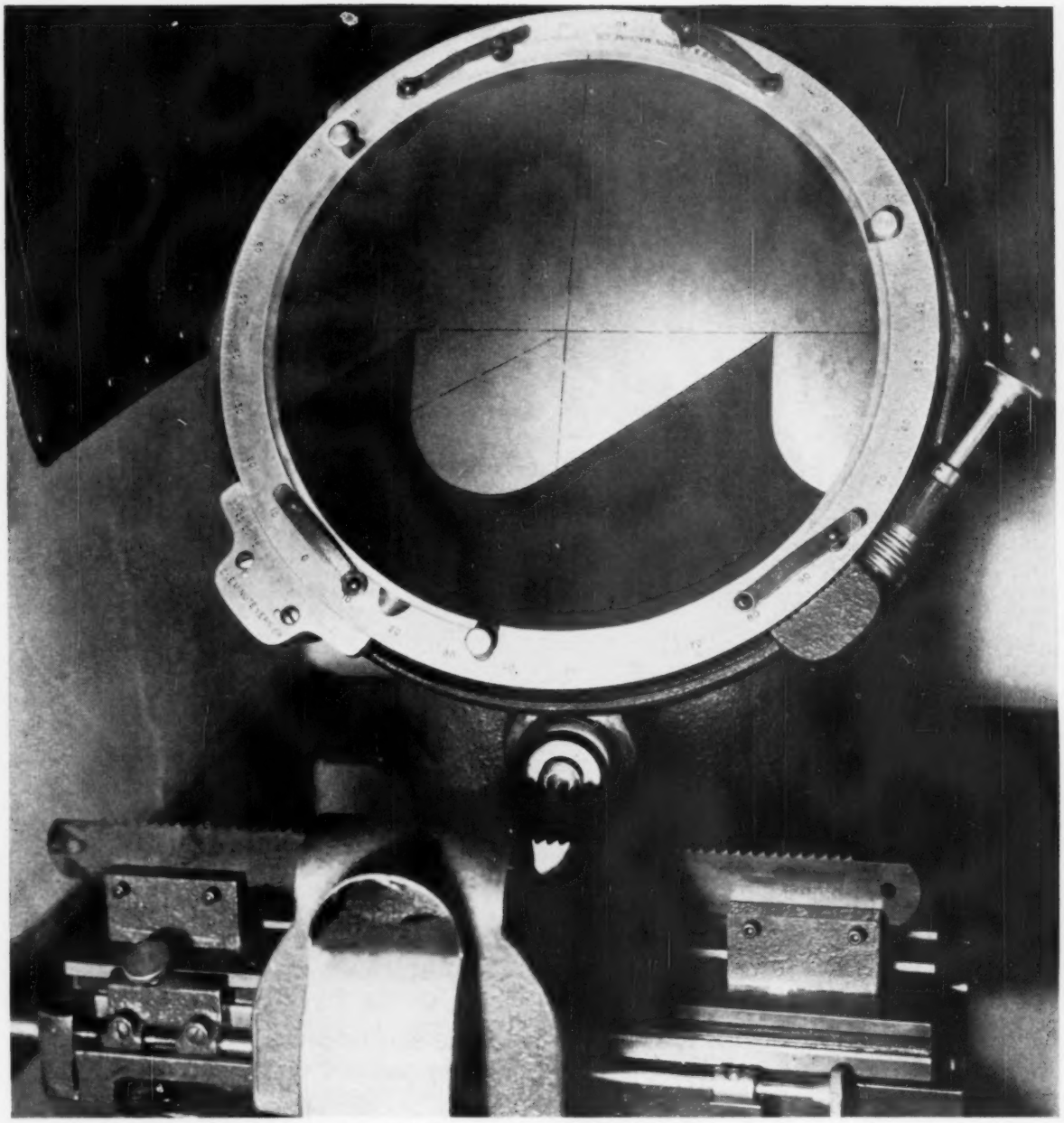
One of them is in your telephone.

Pick it up and call SHEFFIELD for further information on automatic gaging and assembly machines. CL 4-5377, Ext. 211, 212, 213.

The **SHEFFIELD** *Corporation* *Dayton 1, Ohio*

A subsidiary of the Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.



CAN YOUR SAW BLADE PASS THIS TEST?

The best way to test the superiority of a Nicholson or Black Diamond blade is, of course, use. Fit one into your saw and try it. You'll know. It's the finest blade made.

But—one of the reasons for that superb performance is the Micro-Photo Quality Control Test (above). It permits constant checks on tooth formation, cant and degree of coarseness in Nicholson and Black Diamond hand hacksaw, power hacksaw and band saw blades.

Can your saw blade pass this test? It can if it wears the Nicholson or Black Diamond name.*

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them. Send for our valuable text on industrial sawing techniques.

NICHOLSON FILE COMPANY, Providence 1, Rhode Island
Gentlemen: Please send me a free copy of your book, "Sawology."

Name_____

Firm_____

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City_____ Zone____ State_____

NICHOLSON U.S.A. **NICHOLSON** BLACK DIAMOND U.S.A.

Nicholson File Company, Providence 1, Rhode Island • Files • Rotary Burs • Hacksaw and Band Saw Blades • Hole Saws • Ground Flat Stock • Industrial Hammers

How to cut your disposable-tooling costs by 30 per cent at no sacrifice in quality or output. (Answer is on the next page.)

With the new Carb-O-Lock toolholder-insert combination. The single most important advance in the whole history of metal-cutting.

Save 30 per cent when you buy it. Save 40 per cent when you use it.

These are minimums. Users of the Carboloy Carb-O-Lock toolholder-insert combination have reported savings many times higher. Why?

Simple. The Carb-O-Lock design is simple. Using a cam-action locking principle, the Carb-O-Lock has just three parts (not including insert). Insert changing and indexing is a breeze; parts inventories can be held to absolute minimums. Streamlined design lets you bring the toolholder closer to your work. And less overhang means less vibration, less insert chipping and breaking.

Plus: the Carb-O-Lock gives you proven performance. A major diesel engine manufacturer discovered Carb-O-Lock allowed nearly triple the feed, eliminating two machines. A locomotive and car equipment company found Carb-O-Lock's simple, rugged design reduced time for tool changes and permitted maximum horsepower utilization.*

Carb-O-Lock inserts are available now in Grade 883 for machining cast iron, as well as many operations on the following materials: high-temperature alloys, type 300 stainless steel, brass, bronze.

So start your savings program today. Phone your Authorized Carboloy Distributor and order your Carb-O-Lock toolholder-insert combination. Save 30 per cent. And more.

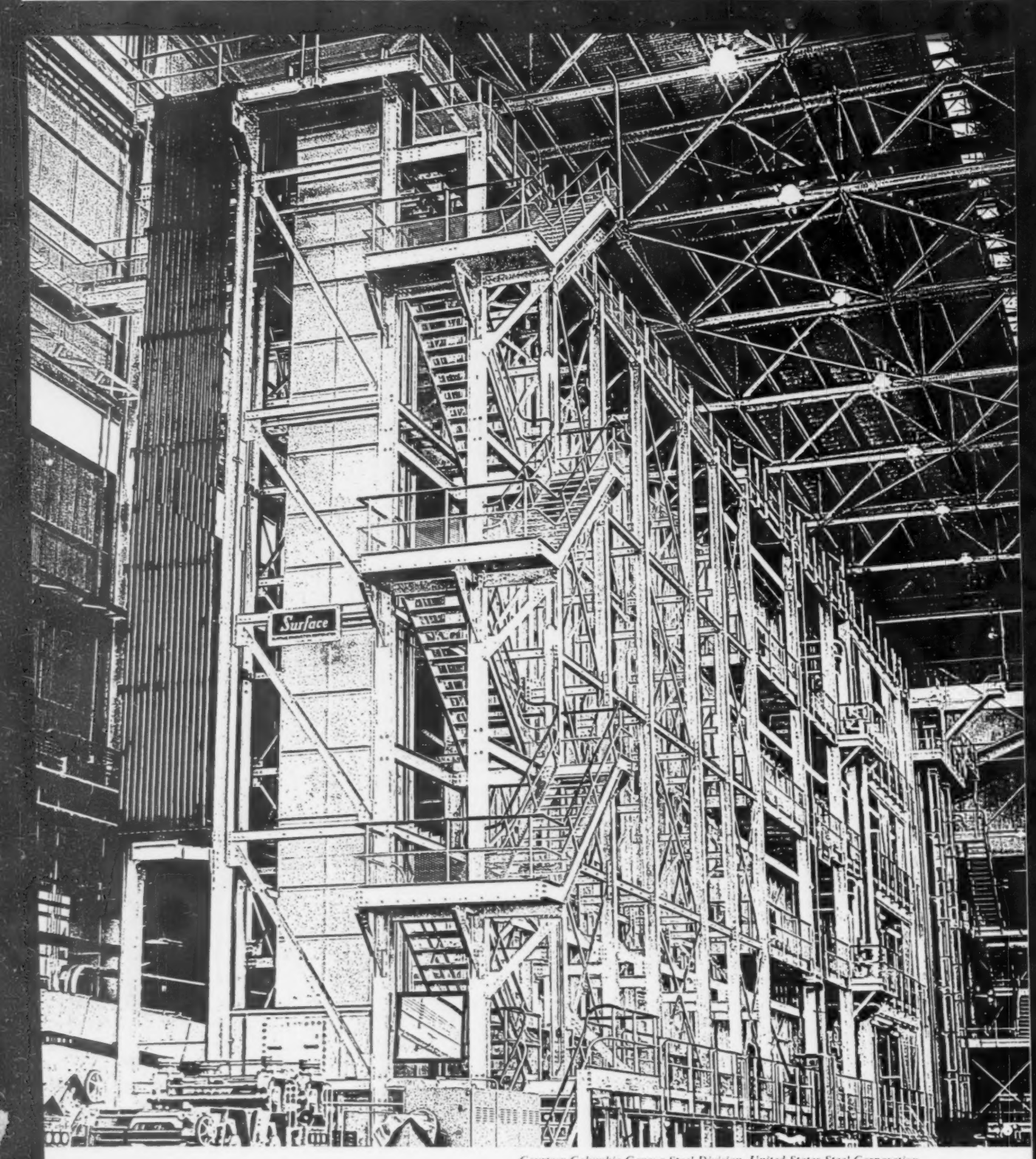
Metallurgical Products Department of General Electric Company, 11153 E. 8 Mile Street, Detroit 32, Michigan.

**Case histories available on request*

CARBOLOY.
CEMENTED CARBIDES
METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY CEMENTED CARBIDE BLANKS AND DISPOSABLE INSERTS • BRAZED TOOLS • TOOLHOLDERS • CARBIDE DIES • WEAR PARTS

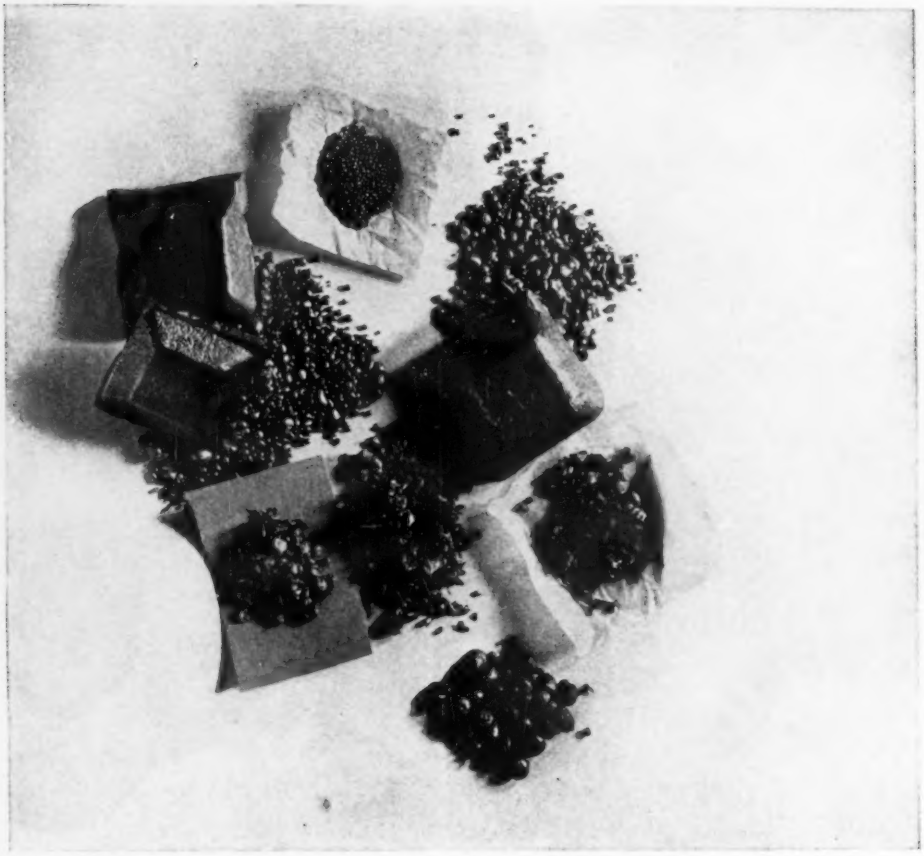


Courtesy Columbia-Geneva Steel Division, United States Steel Corporation

Sign of performance better than specified: The modern tin plate industry demands highest quality at lowest operating cost—requirements which can be met only with continuous annealing, a process pioneered by Surface. This Surface installation produces 96,000 lbs/hr of .010" strip at speeds up to 1500 fpm. Address inquiries to 2402 Dorr Street, Toledo, Ohio.

SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR



ASARCO ALLOY ADDITIVES

Improved alloys at less cost with "ready to add" master alloys

Asarco alloying materials, produced under strict metallurgical controls, reduce alloying costs, improve casting performance, and contribute substantial savings in subsequent production costs.

BISMUTH is used to improve the dispersion of graphite in malleable iron castings. Available in shot, pellet and ingot forms.

SELENIUM improves machinability of stainless steel, controls its porosity. Asarco master alloys include ferro-selenium and nickel-selenium containing 50-60% selenium, and selenium powder.

TELLURIUM is used for degasifying, to minimize porosity, and improve machinability of stainless steel. It is also used for producing hard chilled iron castings. Ferro-tellurium containing 50-58% tellurium is available in chunk form. Tellurium is also available in powder, stick, slab and tablet forms.

Federated Metals Division produces and sells:

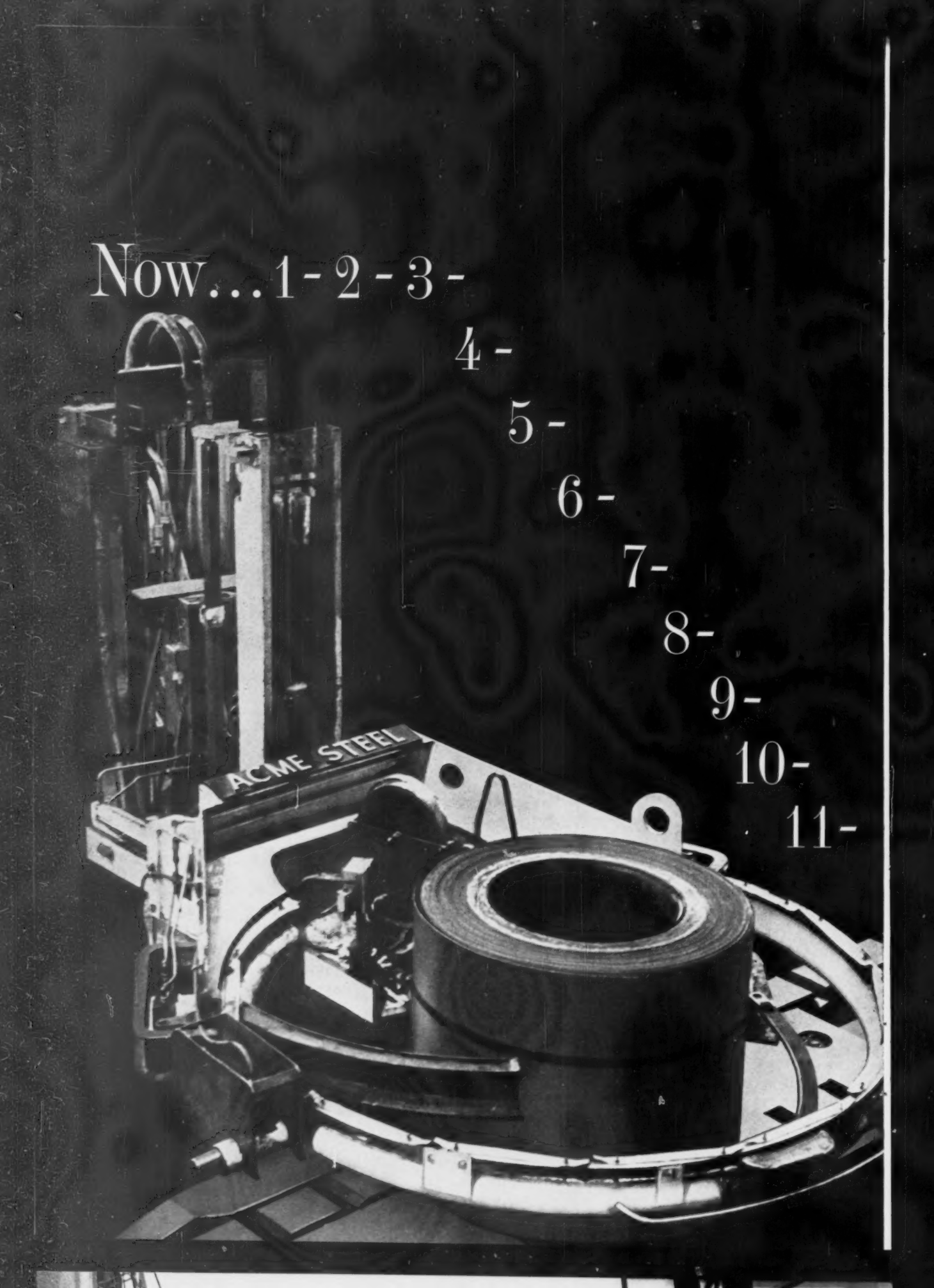
PELLET LEAD, readily assimilated into molten steel, dissolves into finely dispersed particles which lubricate and result in faster, smoother machining, longer tool life.

PHOSPHOR COPPER used as a deoxidizer, in shot or waffle form, improves castability, assures sharper detail, reduces porosity.

OTHER ALLOY ADDITIVES produced by Federated are: Aluminum, Arsenical Copper, Chromium Copper, Copper-Nickel Shot, Manganese Copper, Silicon Copper, Titanium Aluminum, Copper Magnesium, Copper Shot, Cadmium Copper, Copper Iron, Aluminum Copper.

For complete information, write on your company letterhead to: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, New York.

ASARCO


Now...1-2-3-
4-
5-
6-
7-
8-
9-
10-
11-
ACME STEEL

17 seconds to strap a sizzling coil!

The new F5 Strapping Machine is another industry "first" from Acme Steel. Here is one of five hot strip mill installations. This remote controlled F5 has *doubled* coil strapping production in addition to relieving two 2-man crews of a skin scorching task.

At the push of a button, it feeds and tensions the strap, then makes its own seals and shears the heavy-duty 1¼" strapping—all in about 17 seconds. Time, naturally, varies with the size of the coil.

Versatility is another virtue. The F5 can handle the full range of hot mill coils. It is custom designed for you. In addition to strapping horizontally as shown, other machines in hot coil production are strapping vertically and tying through the eyes. Other types of F5 installations include strapping cold coils and bundling sheet steel, bars, rods and structural roof joints.

Being basic producers ourselves, we face the everyday trials of getting steel products produced and shipped profitably. Our own plants were the testing grounds for the F5, as they are with other Acme Steel equipment. Engineering with first hand industry savvy is the basic reason why steel mills and fabricators using strapping equipment specify Acme Steel.

If you would like to see the 15 minute color movie we have prepared on this installation, call your local Acme Idea Man or return the coupon.

Another first from ACME STEEL **IDEA LEADER IN STRAPPING**

Another one of five F5 hot coil strapping installations.

Acme Steel Products Division, ACME STEEL COMPANY
Dept. IFS-121, 135th Street & Perry Ave., Chicago 27, Illinois

☐ I would like to arrange to see new F5 color movie.

☐ Have Acme Idea Man call with full F5 facts.

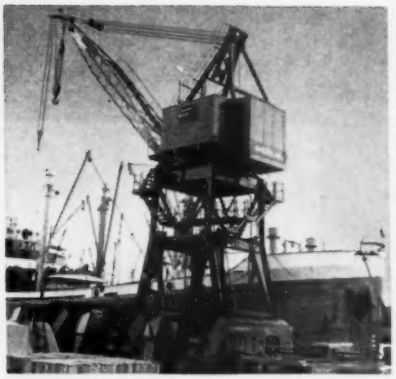
Name_____ Title_____

Firm_____

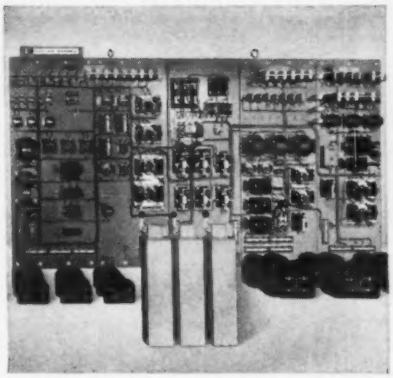
Address_____

City_____ Zone____ State_____

WHAT'S NEW
IN
A-C REACTOR
CRANE CONTROL?



American Hoist & Derrick Company's large 50-ton revolving crane at Port of Milwaukee features Cutler-Hammer's new a-c reactor crane control.



Reactor Control integrated panel for three-motion crane is shown above. Notice advantages of convenient front wiring in Cutler-Hammer's new steel panel system.

CONTROL

New! Get the right a-c control for your crane from Cutler-Hammer

Which of these a-c reactor control features will solve your problems?

☐ *Static* ☐ *Stepless* ☐ *Float Control* ☐ *Cushioned Starting*

To meet your most demanding needs for reactor crane control, Cutler-Hammer can supply a variety of combinations — all static and static-contactor types.

These lab and field tested options make it possible to tailor the control to the crane's working conditions . . . very important to satisfactory performance of a-c reactor controlled cranes.

CHECK THESE CUTLER-HAMMER FEATURES

- **Reactors** feature grain oriented laminated "C" cores and aluminum strip wound power coils. Entire reactor is dipped in a polyester resin to mold the various parts into a unified mass and provide permanent moisture seal.
- **In primary systems,** all four reactors are identical to simplify parts inventory. In secondary reactor controllers, three identical reactors are supplied.
- **Panels** are all front connected steel. All control and power connections are brought to terminal boards. Rear access is unnecessary.
- **Pre-amplifiers,** where used to obtain speed regulations, are static magnetic so static feature is preserved.
- **Unit panels.** Various control functions are grouped for ease of trouble-shooting and maintenance.

CUTLER-HAMMER REACTOR CRANE CONTROL

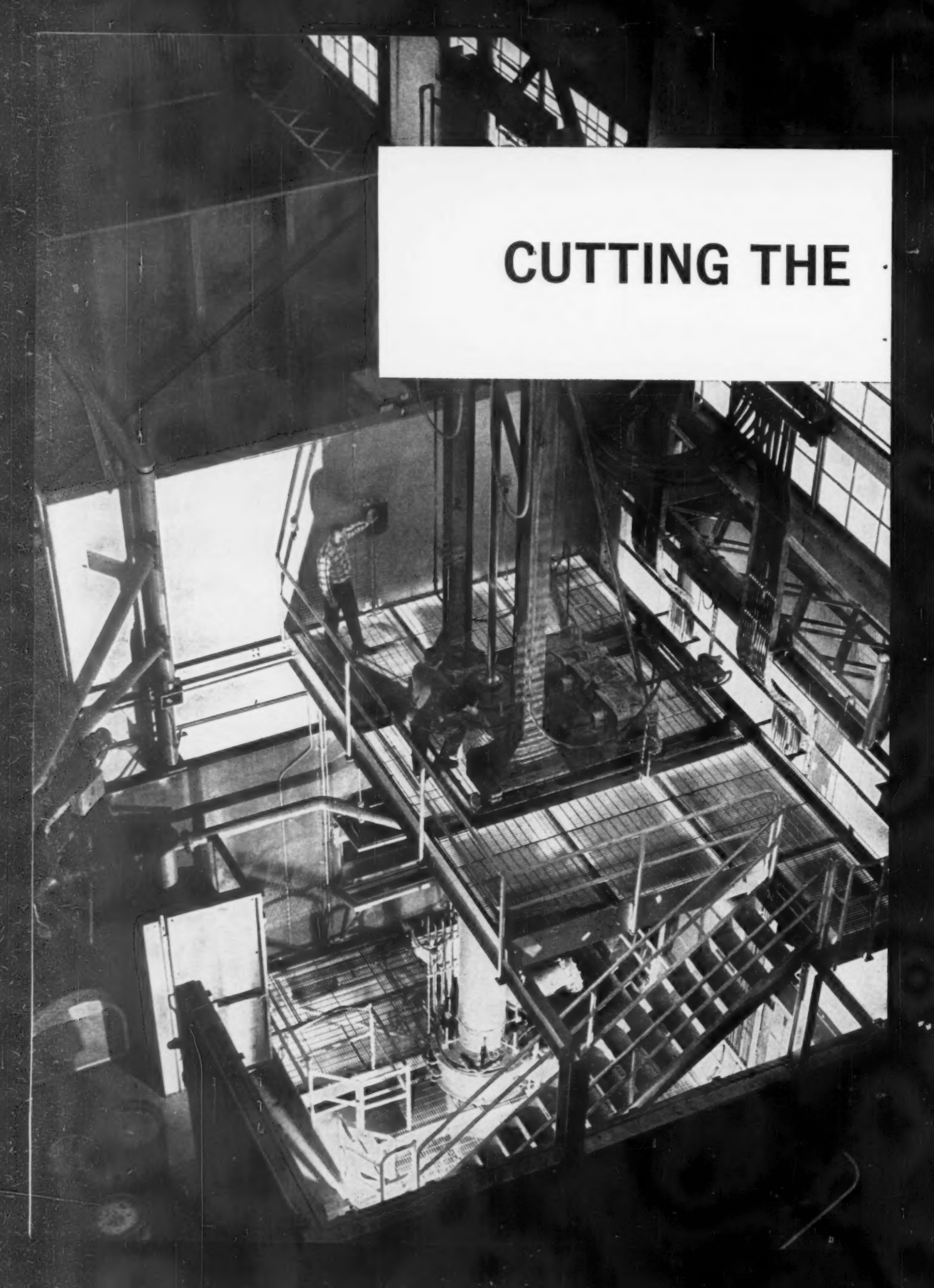
Reactor Control	Primary Components	Bulletin Number	Secondary Components	Master Response	Application
Secondary	Reversing Contactors	14180	Controlled Reactors and Resistor	Torque	Reversing Plugging Bridge or Trolley Drive
		14181	Controlled Reactors and Resistor	Speed	Reversing Plugging Bridge or Trolley Drive
		14182	Controlled Reactors Resistor & Contactors	Speed	Counter-torque Hoist
Primary	Primary Magnetic Amplifiers	14186	Resistor Resistor and Fixed Reactor	Torque	Reversing Plugging Bridge or Trolley Drive
		14187	Resistor Resistor and Fixed Reactor	Speed	Reversing Plugging Bridge or Trolley Drive
		14188	Resistor and Fixed Reactors	Speed	Static Reversing Hoist Drive
		14189	Resistor and Two Contactors	Speed	Reversing Hoist Drive

WHAT'S NEW? ASK . . .

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.

CONTROL



CUTTING THE

COST OF RELIABILITY

...with 20,000-pound heats of Republic Vacuum-Melted Metal

Processed into billets, sheets, bar, strip, or wire, vacuum arc melted metals are being delivered in quantity, on time, at reasonable cost.

To minimize the cost, Republic produces vacuum-melted metals in larger melts—4,000 to 20,000 pounds. Integrated facilities process 18- to 32-inch diameter ingots into a wider range of product sizes and conditions than ever before possible.

Republic's consumable electrode vacuum-melting process improves mechanical properties—tensile strength, ductility, fatigue life, and performance at high and low temperatures. Precise control reduces nonmetallic inclusions and harmful gases.

Our metallurgists will help you select and apply the vacuum-melted metal best suited to your requirements: *constructional alloy steel, high strength alloy steel, bearing steel, stainless steel, super alloy steel, titanium, or special carbon steel.* For information, contact your nearest Republic sales office or mail the coupon.

CONSTRUCTION ALLOY STEELS • HIGH STRENGTH STEELS • BEARING STEELS • STAINLESS STEELS
SUPER ALLOY STEELS • TITANIUM • SPECIAL CARBON STEELS

REPUBLIC

PH STAINLESS STEELS . . .

Republic PH 15-7 MO* for missiles and aircraft offers high ultimate tensile strength with excellent mechanical properties to 1000°F. Republic 17-4 PH* for shafts, gears, pins and other components requires only a one-hour heat treatment at 900°F to develop its full strength (ultimate tensile strength to 200,000 psi). Republic 17-7 PH* for pressure tanks, bellows, springs, and other applications provides better corrosion resistance than the hardenable grades of chromium stainless. Send for PH Stainless Steel Booklet.

**Licensed under Pat. Nos. 2482096,2505763 and Trade Mark of Licensor.*

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REPUBLIC HAS THE FEEL FOR MODERN STEEL

REPUBLIC STEEL CORPORATION
DEPT. IA-1590-A
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

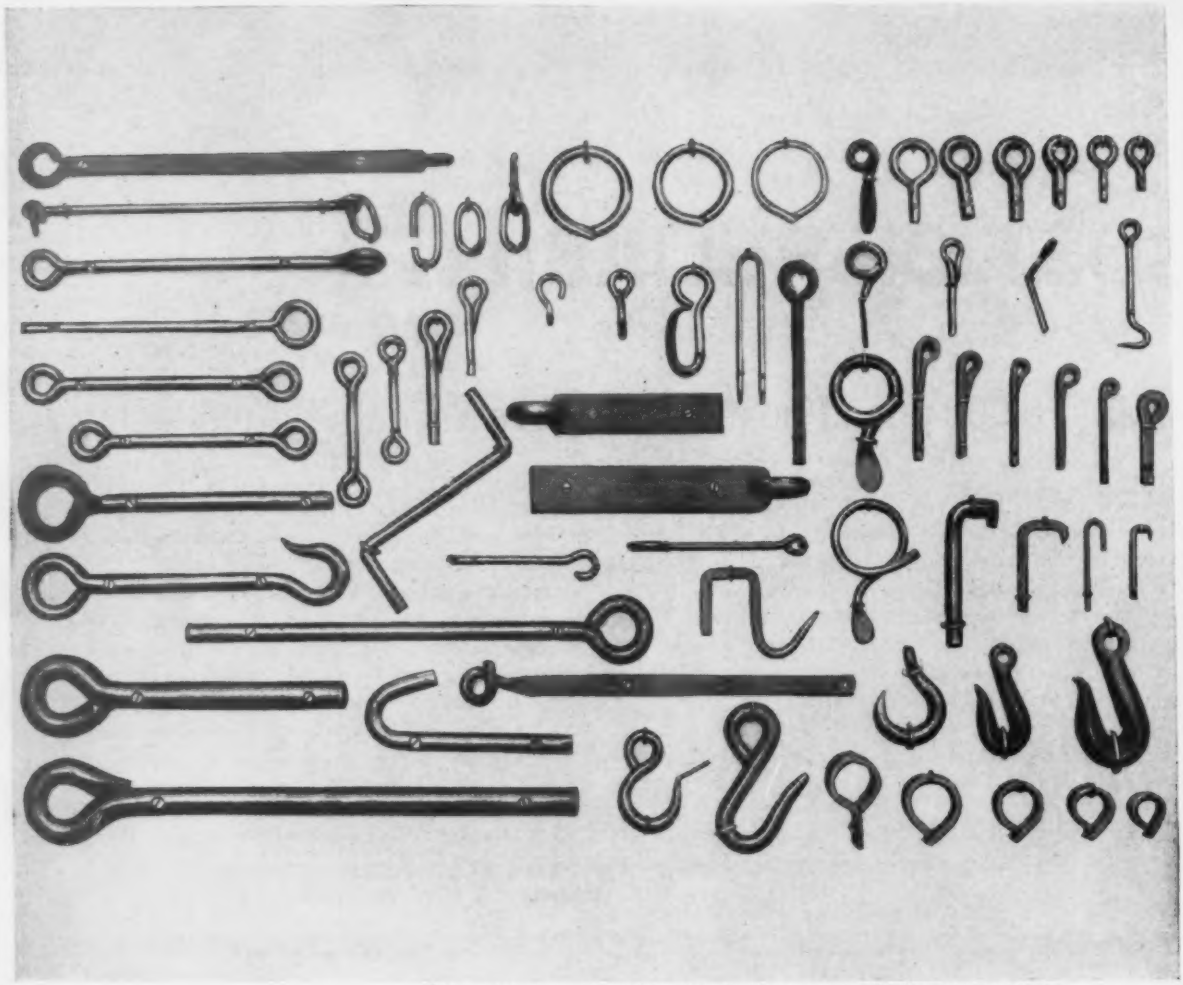
Please send more information on:
- ☐ Republic Vacuum-Melted Metals
- ☐ PH Stainless Steel
- ☐ Have a metallurgist call

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____



Shown above is a wide variety of applications possible with the W-W Eye Bender.

BENDING PROBLEMS? Investigate the Williams-White Hydraulic Eye Bender

This fast, universal machine, expressly designed for economical bending of oval or round eyes, hooks or simple right angles, will handle stock to ¾" in diameter around a 1" mandrel or 1" diameter stock, hot, around a 1½" mandrel. Compact in size and economical to operate, this versatile machine is capable of producing 1,200 completed bends per hour. Photo shows its wide versatility.

Using interchangeable dies, a vast number of different bends can be made on the same machine. An inching arrangement allows fast die change to maintain peak production rates.

For additional information on how to achieve maximum production and economy on your bending operations, get your copy of Bulletin No. 71 or write, detailing your bending problems.

WILLIAMS-WHITE & CO 600 Third Avenue, Moline, Ill.

the measure of Performance Reliability for more than a century

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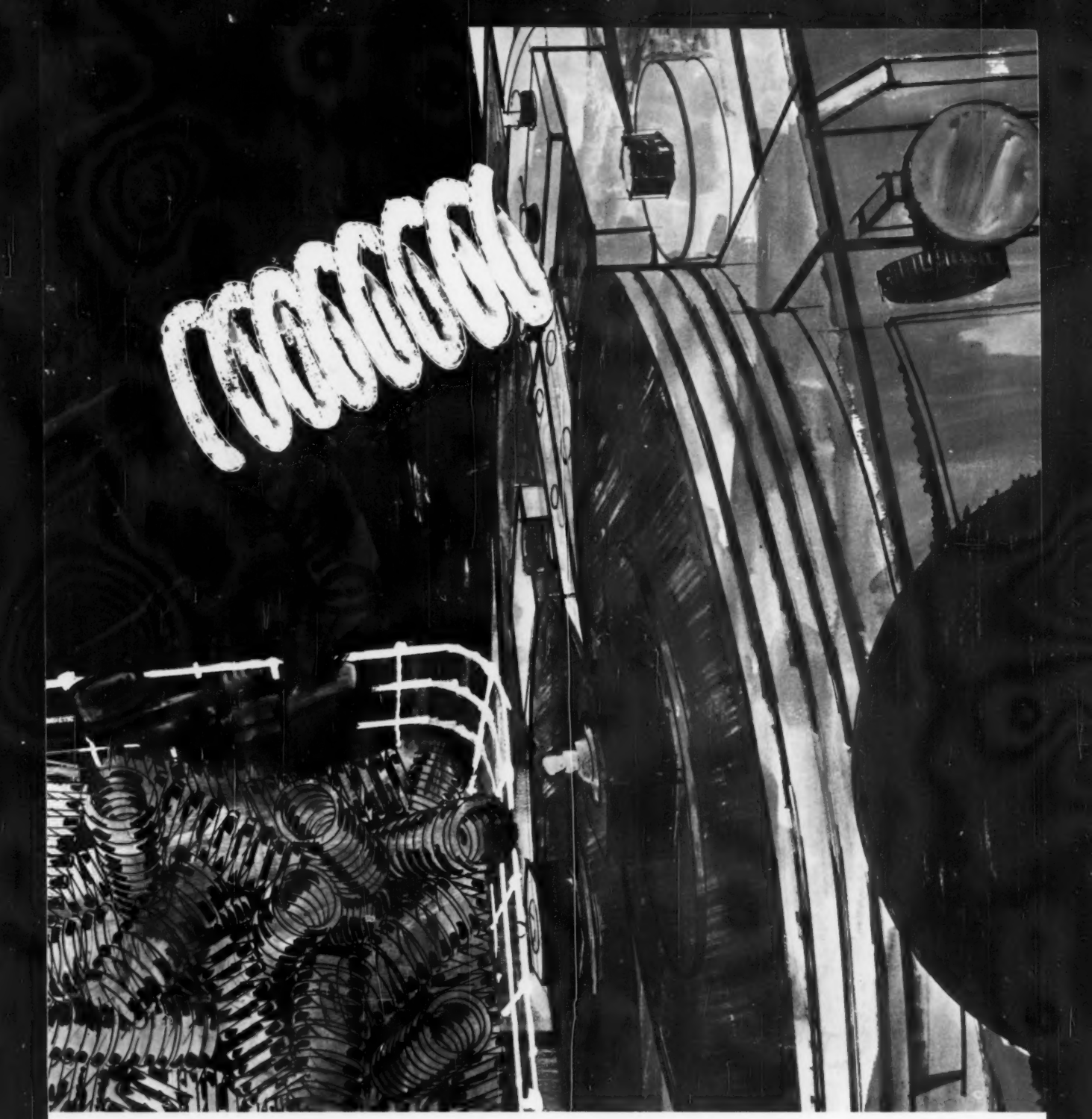


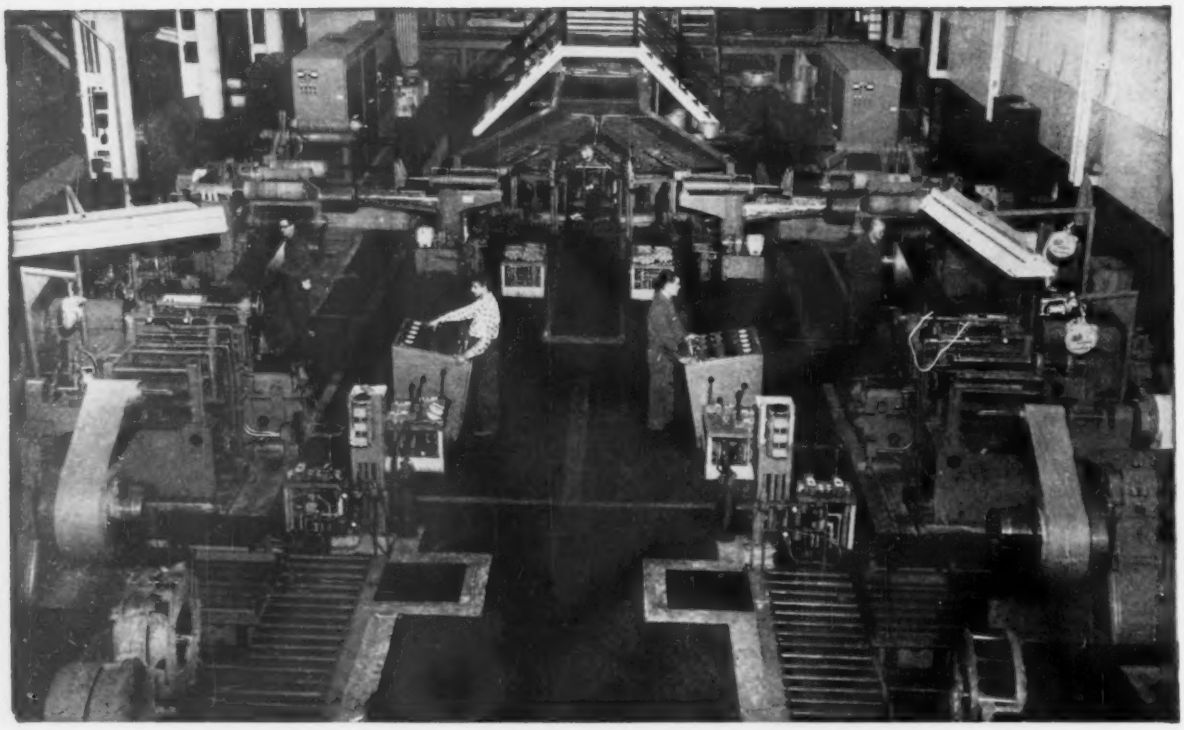
N-S Spring Wire...

The complete line—engineered for reliability—precision drawn stainless steel wire, music spring wire, flat wire and strip, superalloy wire, heavy galvanized wire, plated wire, rocket wire (extra high tensile). Other wire specialties and experienced National-Standard engineering service help meet your special requirements.

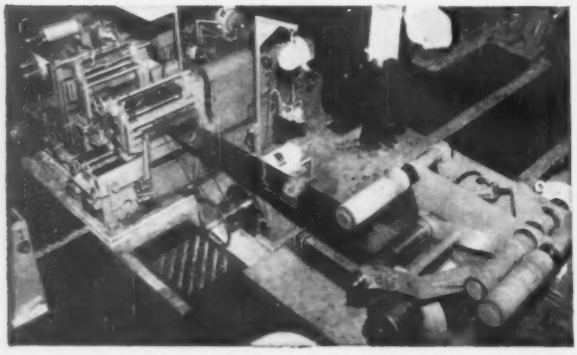
NS NATIONAL-STANDARD COMPANY

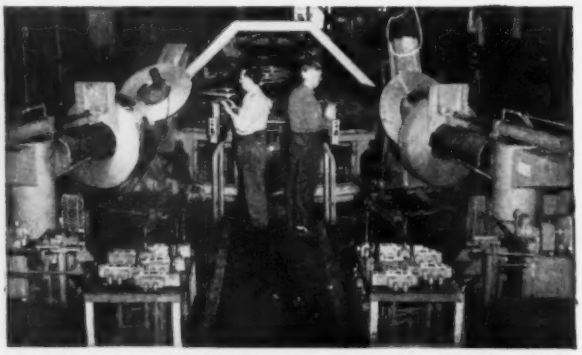
NATIONAL-STANDARD COMPANY

Niles, Michigan



Predictable Performance...





SECO Slitting Installation, Superior Steel Division, Copperweld Steel Company, Carnegie, Pa.

is automatic—start to finish—with a SECO Slitting Line

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

Every operation in this *complete* slitting line by SECO—from entry to exit of coils—is fully automated. It was specifically designed and built by SECO to meet the maximum performance requirements of the Superior Steel Division, Copperweld Steel Company, Carnegie, Pennsylvania.

SECO's staff of experienced sales engineers, specialists in production problem solving, are prepared to show you how you can get "predictable performance" in *your* operation—whatever your requirements. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles, California.

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

Give steels that extra "edge" *with Vancoram Columbium Alloys*

Gleaming stainless, carbon steels, high-temperature alloys, and rugged low-alloy constructional steels all develop improved properties when they're made with Vancoram Columbium Alloys. To give austenitic stainless steels better weldability, and to promote formation of stable columbium carbides, use Vancoram Ferrocolumbium. In straight chromium stainless, addition of Ferrocolumbium will prevent "roping," and in carbon and low-alloy constructional steels columbium improves strength. Both the regular Vancoram Ferrocolumbium and Thermocol® Exothermic Ferrocolumbium provide extremely low, controlled tin residual and high columbium content. Thermocol permits large additions of alloy with minimum heat loss, and its high recovery (often over 90%) means lower production costs. See your VCA Representative or write for full details. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

SEAWAY STEEL gives you
the *exact* steel you need
when you need it!

We can produce
any size rod or bar
to your exact specifications and
...produce it faster.

SPECIAL ANALYSIS

SPECIAL SURFACE FINISHES

SPECIAL HARDNESS

SPECIAL HEAT TREATING

QUALITY-FORGING AND COLD HEADING

SOME SCHEDULES
CAN'T BE CHANGED
OURS CAN

NEED NICKEL ?
If you want the flexibility
and personal service that can
come only from an
INDEPENDENT SOURCE OF
ROLLED NICKEL ANODES...call us.
SEAWAY NICKEL DIVISION
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Steel

SEAWAY STEEL DIVISION

ROBLIN-SEAWAY INDUSTRIES, INC.

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SALES OFFICES: BUFFALO • NEW YORK CITY • CLEVELAND • DETROIT

MORE EXECUTIVES ARE BEING SOUGHT by industry than at any time since 1959. This is the finding of a survey of 138 major companies made by the management recruiting company, Executive Manpower Corp. During the next six months, the companies, with annual sales averaging $133 million, will fill three managerial positions each. Salaries range from $10,000 to $75,000. The need for sales executives heads the list. They account for 30 pct of the total need. Some 9 pct of the openings are in marketing.

FABRICATED STRUCTURAL STEEL SALES in 1961 will be the third highest, according to the American Institute of Steel Construction. Bookings of new orders in 1961 are estimated at 4 million tons, a gain of 11 pct over 1960. And bookings for 1962 are forecast at 4.3 million tons.

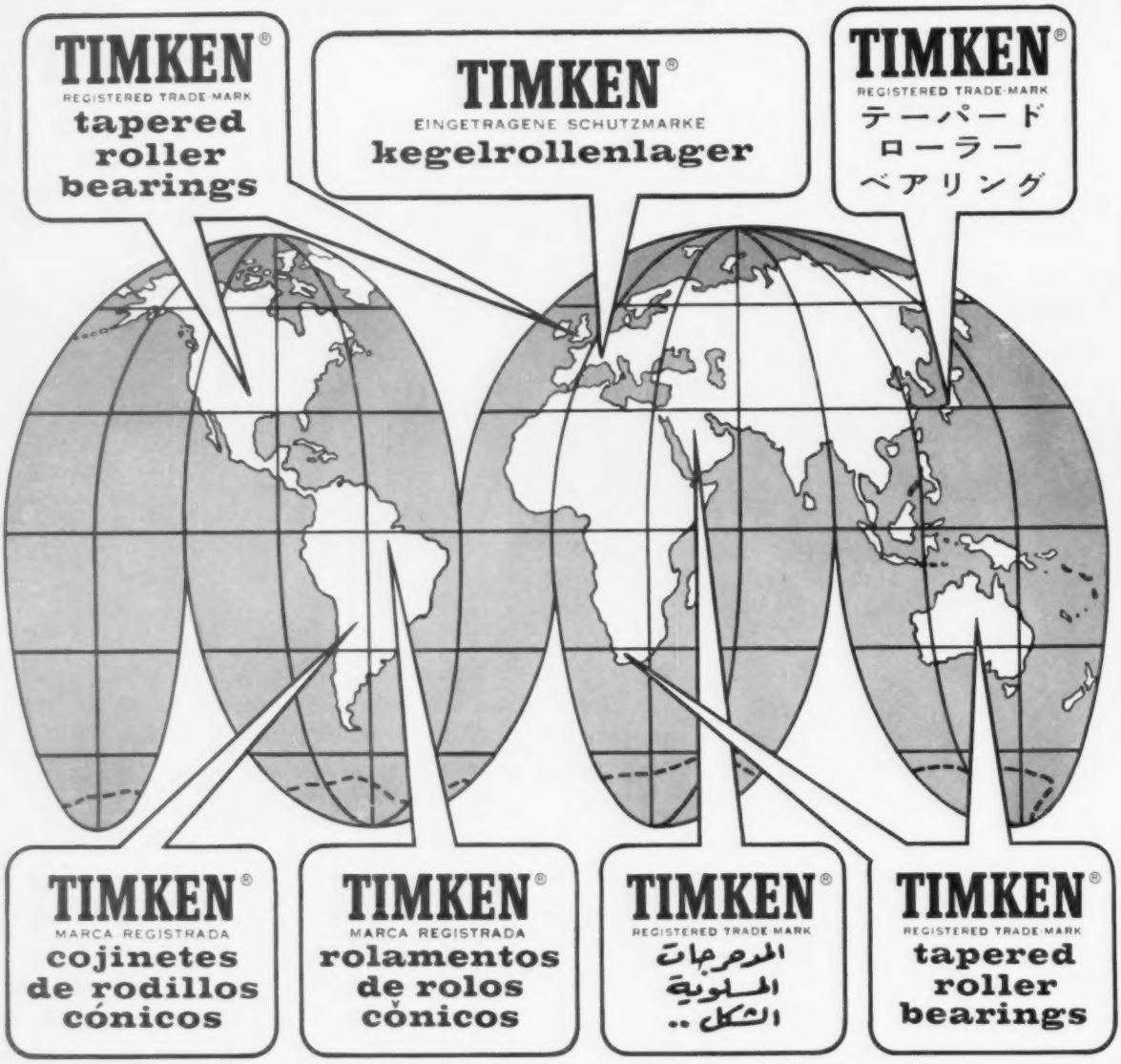
SERVICE CENTERS ARE BOOSTING ALUMINUM STOCKS to meet anticipated first quarter sales gains. These gains are expected to push sales above the levels of recent years. Already, aluminum producers are moving at sharply advanced levels in anticipation of big first quarter consumer and service center demand.

WATCH FOR U.S. APPLIANCE MAKERS to begin wooing the European market with new vigor and new approaches. One approach: Setting up of automat-type public laundries to acquaint buyers with U.S. equipment. However, direct sales efforts will be stepped up in conjunction with equipment introduction in laundries.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a 27.9 pct increase from September to October. The October index was 285.5 (1947-49=100) for new bookings. The October shipments index was 237.8, up from 225.4 in September.

FACTORY SALES OF ELECTRONICS will reach $10.15 billion this year, says the Electronic Industries Assn. This will be an all-time high. And 1962 sales are projected at $10.8 billion. Here's the product category breakdown for 1962 sales: Consumer products, $2.1 billion; industrial items, $2.1 billion; military products, $5.6 billion; replacement components, $1.0 billion.

SALES OF MAJOR ELECTRICAL APPLIANCES had a setback in October. Industry sales of all appliance types declined from September, except for a fractional gain in dishwashers.



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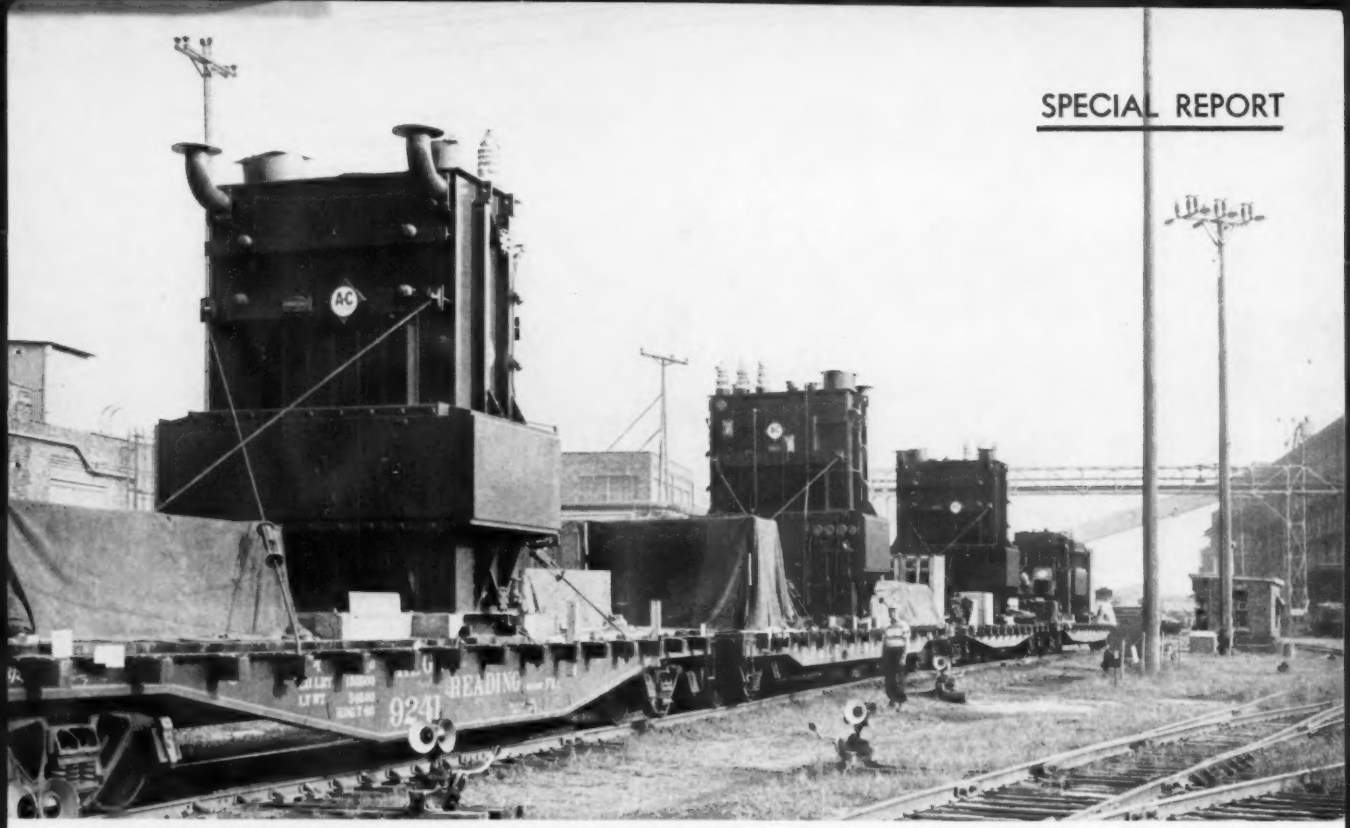
And when you buy Timken bearings, you're assured of the engineering service of the world's most experienced and largest manufacturer of tapered roller bearings. The name "Timken" is a trade-mark identifying the bearings, steel and rock bits made by The Timken Roller Bearing Company and its subsidiaries and divisions the world over. The Timken Roller Bearing Company, Canton 6, Ohio, U.S.A. Cable address: "TIMROSCO". Timken bearings manufactured in U.S.A., Australia, Brazil, Canada, England and France.



CALIFORNIA BOUND: Electric transformers enroute to Pacific Gas & Electric Co.

Electric Power: A Growing Market for Metalworking

Utilities to spend up to $52 billion on new plants alone during the 1960s.

By 1970-80, that figure may nearly double.
By K. W. Bennett

■ The Soaring Sixties, at least for the electric power industry, arrived on schedule. Now the industry is revising its own forecasts—upward.

With electrical power demand rising 7.5 pct per year, utility men say new markets for their product are still developing, while old markets still are not saturated.

At least a quarter million homes have gone on electric heating in the past two years. The Rural Electrification Administration, with a half million customers, has $3 billion out in distribution loans alone. Industry sources believe the electric industry now represents $43 billion in plant and equipment.

Spending to Increase — Utilities will spend up to $52 billion on new plants during 1960-70, and $91.4 billion in the 1970-80 period. That's a rate of $12 billion per year. From 1949-59, they spent an estimated $30 billion.

Items bought will range from million kw generating plants, to line repair trucks. Some government statisticians have revised their estimates of the electric power use upward in line with the industry's optimistic forecasts.

One northern utility predicts growth of air conditioning will cause cities as far north as Minneapolis to face summer peak loads in 1962. Two years ago, this would have been regarded as impossible. Aluminum, another heavy current user that had too much capacity, may expand in 1963. In the residential market (fastest growing electric user in many areas), new electric power uses have been developing at the rate of three every two years. The clothes dryer market, for example, is still only 20 pct saturated, say utility men.

Bigger Generators—In power generation, the move is to bigger generators. The Tennessee Valley Authority has gone to a million kw generator. Commonwealth Edison Co., Chicago, and Consolidated Edison of New York, are turning to half-million kw generators. These

are conventional units and are not rated with experimental ones like Pacific Gas & Electric's $61 million nuclear plant for 1965.

Small utilities are also pooling capital to buy bigger, more efficient generators. One such pool recently bought a generator equal to its total pre-1961 generating capacity. It also will handle power for the three utilities more economically than older, smaller generators.

The push to bigger equipment has divided industry suppliers. Some equipment builders feel the power industry buys on a five-year cycle. Utilities deny this. They say industry buying has exceeded $3 billion annually for several years, with half going for generating equipment. Both agree, however, that generator outlays are rising. One equipment builder points to a 20 pct gain this year and sees at least 5-10 pct more business in 1962.

Reserves Question—Some generator suppliers say utilities have a 30 pct reserve and won't really get interested until it shrinks to 22 pct.

But utility construction officials disagree. They claim only a 20 pct reserve and say this is being allowed to shrink. A few big producers have cut reserve generator capacity to only 10 pct over current load peaks. They say it will fall to 8 pct and the entire industry will follow the trend.

This would suggest fewer generator sales during 1960-65. But utilities say they will invest more capital, and nearly half of total capital outlays will be for generators.

There's a particular need for bigger, more efficient peak load generators. These are used only when special weather conditions, or industrial demand boost current use to extremes. A new breed of steam generator, bigger than any now used, is now regarded as the best bet.

Coal Benefits — An offshoot of this is that coal is beating out gas on some big generators. Electric utilities now use 50 pct of the coal mined. If coal mining efficiency continues to gain, the figure could hit 60 pct by 1970, even though powermakers get more kw hr of electricity per lb of coal burned each year. Some of the heaviest equipment built by the shovel industry is now being turned out on repeat orders from coal producers who supply the big utilities.

Capital investment by utilities usually suggests pictures of big power stations. Actually, more dollars go into transmission and distribution networks.

Among the big utilities, Pacific Gas & Electric is rated at the top. This power supplier has a $1.9 billion plant. Of this, $877.9 is in generating capacity, $751.7 million in distribution, $347.4 in transmission.

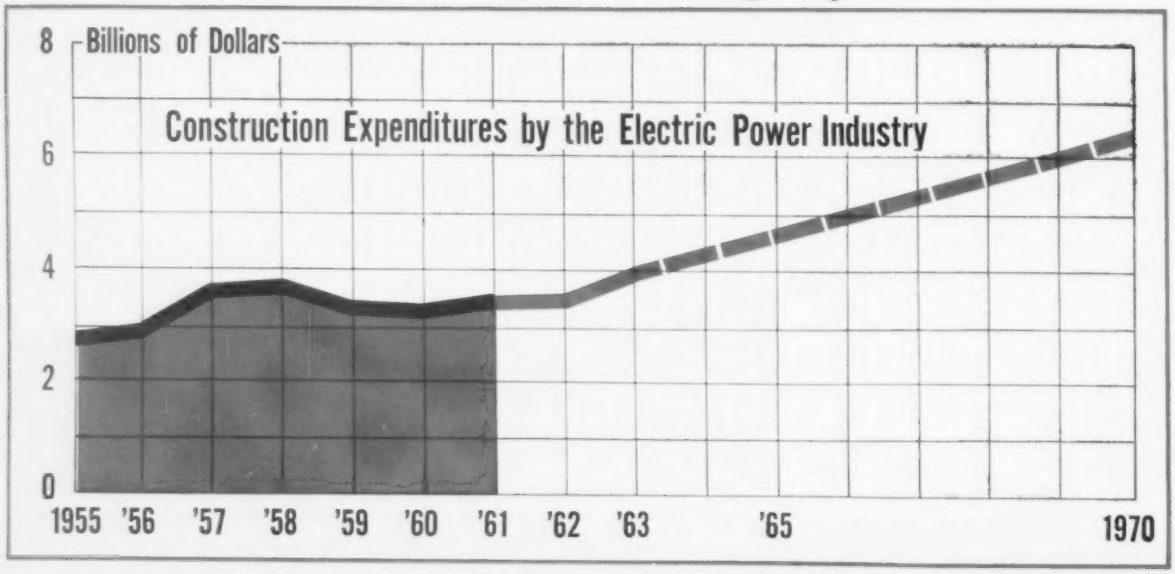
Another Giant—Another giant is Commonwealth Edison at Chicago. With a $1.8 billion plant, only $716 million is invested in generation; $764 million is in distribution and $262 million in transmission.

Consolidated Edison Co., New York, has a $1.7 billion plant; $682 million in generation; $920 million in distribution, $88.8 million in transmission.

Distribution brings electricity to the individual consumer, whether he's at home or in a plant. Dr. J. A. Hucheson, Westinghouse Electric Corp., figures that private utilities have a $20 billion investment in distribution networks and will spend $40 billion over the next 20 years on this end of the business.

Heavier Loads — Examples of what's happening: Chicago's Consolidated Edison has switched from 4 kv to 12 kv cable in its metropoli-

Power Spending Keeps Moving Up



tan distribution lines in five years. In addition to line and construction outlays, this may involve changes in 225,313 line transformers. Many utilities are already installing dual voltage transformers. They handle 4 kv distribution and can be rewired for 12 kv when the system is ready.

Transmission systems carry electric loads from the generator to the distribution system. And the most radical changes in power handling are occurring here.

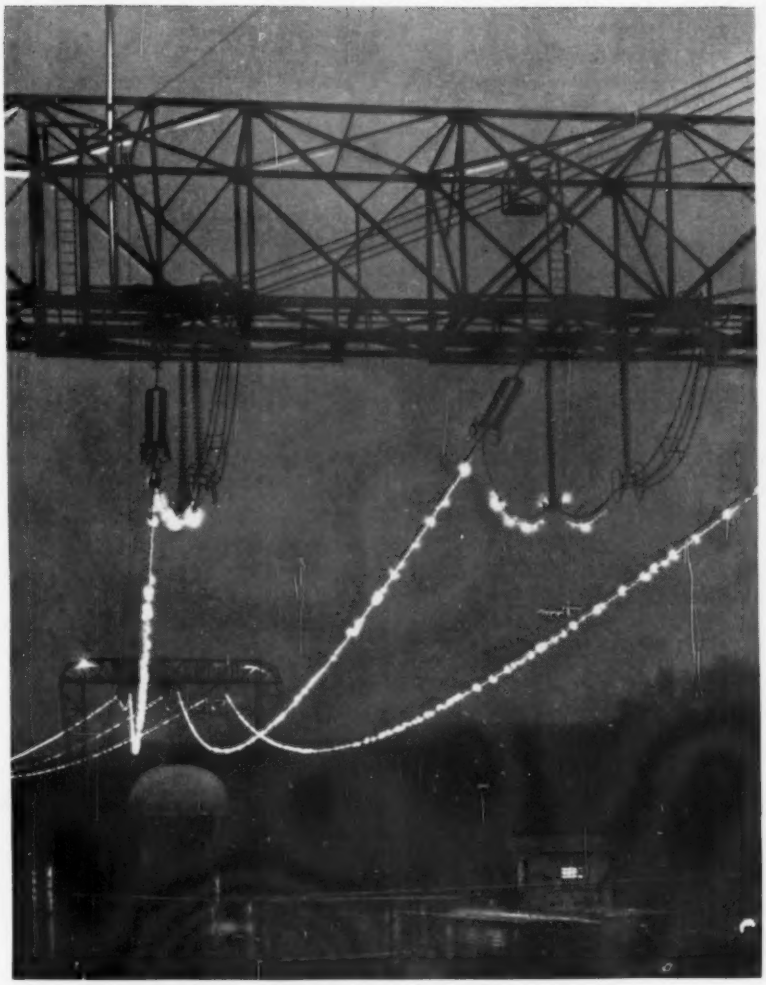
In early 1960, the power industry had 364,000 miles of transmission line worth $6.7 billion. By 1970 the system will have added 100,000 miles of line worth $14 billion. The new system will operate at 345 kv (345,000 volts), compared with today's average of 245 kv. Short lengths will operate at loads of 500 and 750 kv.

Effect on Aluminum — This change is already being felt. Kaiser Aluminum & Chemical Corp. reported an order for 700 aluminum transmission towers. It also received a record order for 16 million lbs of aluminum cable for a 345 kv, 300-mile transmission line.

Both Westinghouse Electric Corp. and General Electric Co., are operating test transmission lines that carry 750 kv loads. These big lines have a steel-cored and aluminum cable. U. S. Steel Corp. has supplied large transmission towers of low alloy, high strength steel. The towers require no painting and little maintenance.

T. G. Ayres, Commonwealth Edison's vice president, engineering, says, "We're building 345 kv lines right now and plan a grid around our system in eight years. We've about 100 miles in now and will have 200 miles by 1966. Three years after that the figure could triple the 1966 figure."

$249 Million Project — Another major power producer, American Electric Power Service Corp., has 10,500 mi of transmission line now. It plans 4500 miles of 345 kv line between now and 1970 at a cost of $249 million. Consolidated Edison plans to spend $1 billion on expansion during 1961-65, half of it on generating capacity. This is against $866 million for 1955-60, of which $489 million went for distribution-transmission and only $377 for generating capacity.



CORONA GLOW: General Electric conductors, energized at 750 kv, are aglow with corona, an electrical discharge.

Consolidated Edison will spend $350 million for generating capacity over the 1961-65 period, and $360 million for transmission and distribution system changes.

How big is the job ahead?

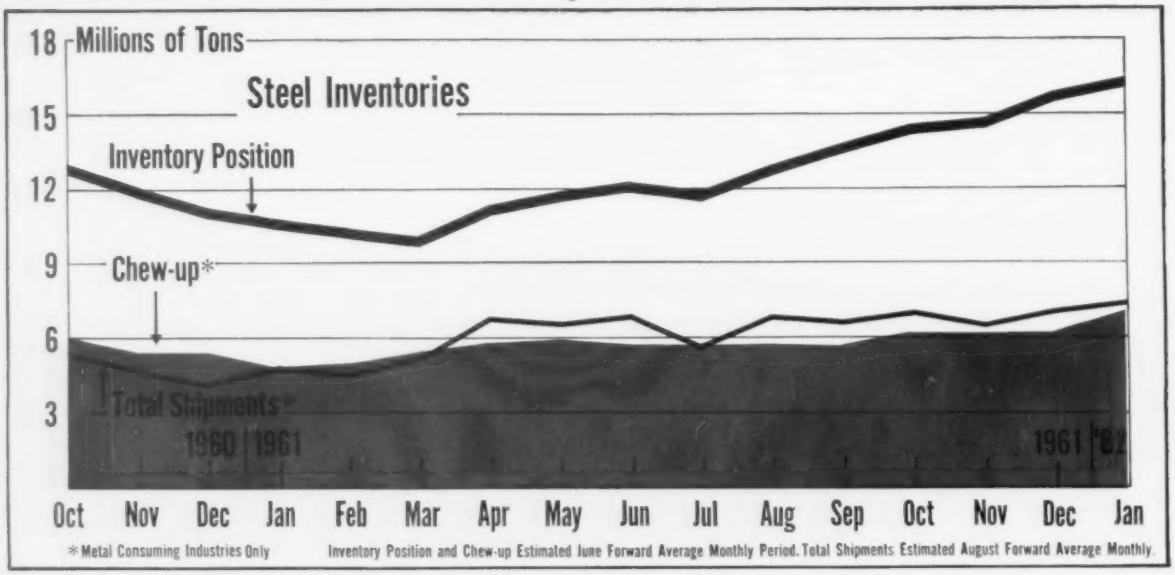
Top Utility—Pacific Gas & Electric Co., is rated one of the nation's top utilities. Its interests range from atomic power plants to conversion of salt to fresh water. It has 77 generating plants. Its transmission system has 4,191 miles of line on towers at a 253 kv load and 5,976 miles of line on poles carrying a top 80 kv load. Its distribution system uses more than 500,000 line transformers.

Systems this size must have bigger generators, heavier lines and distribution systems.

Edison Electric Institute cautions that electric industry capital outlays are difficult to predict for any single year. But it indicates the industry might cross $4 billion in 1963 for an all-time record.

Way Ahead—The U. S. power industry is outstripping every foreign competitor in growth rate. Demand for its own product doubles every 10 years. And despite the bigger base on which percentage of gain must be figured each year, the gain shows no sign of faltering.

How One Market Analyst Sees the Buildup



How Steel Stocks Are Building

Inventory Buildup Through January to Be Orderly, Analyst Says

Look ahead by leading steel analyst shows January stock buildup less than in December.

Rising shipments in December-January will be close to chew-up rate by steel users.

■ An orderly buildup of steel inventories is underway. This should hold at least through January, according to the latest monthly steel inventory analysis of Herman B. Director Associates.

This is the second monthly analysis made for The Iron Age by the Director company, a leading commercial research organization. The new inventory series has been two years in the making. It covers a detailed analysis of more than 50 major industries accounting for 90 pct of U. S. steel consumption. Behind the Director forecasts is a separate analysis showing distribution of steel shipped from Service Centers.

Current Buildup—Total steel mill shipments for December are estimated at 6.8 million tons. This is measured against consumption of 6.0 million tons by metalworking industries. This means that some 800,000 tons will be added to inventories by the end of this month. And, added to the 50,000 tons held by warehouses, this would boost total steel inventories to 15.7 million tons held at Dec. 31. The November inventory position was 14.8 million tons.

The December total steel inventory figures compares with 10.9 million tons held by using industries and Service Centers in December 1960. And the chew-up rate last December was 5.1 million tons compared to the current December rate of 6.0 million tons. Shipments last December totaled 4.1 million tons.

January Buildup — For January, 1962, the Director analysis forecasts total steel shipments to consuming industries of 7.0 million tons. Usage is estimated at 6.5 million tons. To this net balance in shipments is added 50,000 tons that will be held by warehouses on January 31. The result will be a January total steel inventory position of 16.2 million tons, a 650,000 ton inventory rise over December 31, 1961.

Here are increment additions to total steel inventories that show the current and projected buildup rate: November inventories up 430,000 tons; December, up 830,000 tons; January 1962, up 650,000 tons.

Role of Imports—The steel buildup clearly indicates no "stampede" on the mills in the face of improving business and a possible steel work stoppage. This indicates that some steel users may be counting on imported steel as their "ace in the hole."

Home Builders Sight New Gains

3.5 Pct More Houses Due in '62; Pre-Fab Boom Grows

Home builders look for a big sales year in 1962, with 3.5 pct more houses built.

Pre-fab building remains the hottest area of the industry. It may take 17 pct of the single-family total in 1962.
By K. W. Bennett

▪ Sparked by the boom in pre-fab homes, the entire home-building industry counts on gains in 1962.

Opinions vary on the amount. But all sources expect at least 3.5 pct more houses next year.

Federal Housing Administrator Dr. R. C. Weaver forecasts 1.4 to 1.5 million starts next year, or a 5 to 10 pct gain over the 1961 level. Taking the long view, he says the government expects 2 million home starts per year will be needed by 1970.

More Mortgages — Dr. Weaver cites an 18 pct increase in FHA mortgage insurance this year, and an October increase of 19 pct over the same month a year ago.

The rate of housing starts has been climbing, from a 1 million per year rate last December, to 1.4 million per year rate at the end of October.

Repairs to existing homes, a growing source of homebuilder income, soared 22 pct over last year's level. And will rise again in '62.

Less Optimistic — Business sources are not quite as optimistic as government officials. But the National Assn. of Home Builders pegs '62 output at 1.3 million starts, "an admittedly conservative figure." Dr. K. F. Flexner, American Bankers Assn., puts the figure between 1.250 and 1.3 million.

Part of the general optimism is based on increased capital available for housing. Banks suggest money supplies will be up. Government spokesmen point to additional cash from urban renewal programs and liberalized FHA and VA credit. Even the big unions indicate they will divert more funds into the housing field in 1962.

Hottest Pace—But it's pre-fab homes that are setting the hottest pace.

J. J. Madigan, executive vice president of the Home Manufacturers Assn., told The Iron Age that factory-built homes were 13 pct of single family housing starts in 1960. They are running at an estimated 15 pct of 1961 starts. And they will probably hit 17 pct of the single family total next year.

Manufacturers in the field could outrun their own market.

With at least 500 active producers of pre-fab homes, new manufacturers are entering the field at a 50-per-year rate. 1962 is expected to see a number of big name corporations joining the pre-fab business, ranging from heavy equipment to aircraft makers.

Growth Industry—In 1960 this growth industry sold 126,800 units. It is expected to ship 140,000 units this year.

The growing number of competitors hasn't hurt producers already established. One of the biggest, National Homes Corp., sold 16,900 homes last year, and will hit 18,700 this year.

The swing to aluminum siding in homes continues to boost sheet use. Aluminum Co. of America reports that homes used a total of 750 million lb of aluminum in 1961. The industry is shooting for twice that figure in the current decade.

Steady Climb—The 1962 outlook, an NAHB survey concludes, calls for a climb throughout most of the year, with the second half passing the first half. NAHB members expect the 1961 Housing Act to provide a bonus of at least 25,000 homes.

Home Building Set for Rebound

New Homes Built

1945	291,000	1954	1,452,000	
1946	917,000	1955	1,559,000	
1947	1,139,000	1956	1,295,000	
1948	1,227,000	1957	1,184,000	
1949	1,324,000	1958	1,395,000	
1950	1,772,000	1959	1,531,000	
1951	1,360,000	1960	1,260,000	
1952	1,383,000	1961	1,340,000	(Est.)
1953	1,334,000	1962	1,447,000	

Tin Mills Get Set for Big Rush

Can Makers to Build Up Thin Tinplate Stocks

The big question is whether the tin producers will be ready to meet the sudden demand.

Effects of squabble over how thin tin should be made are now being felt.

By G. J. McManus

■ Two major swings promise to make tinplate one of the liveliest products in the steel picture next year.

Can companies will be converting from conventional plate to thin stock on a massive scale in 1962. In the first half of the year, they will go abruptly from tight inventory control to heavy inventory buying.

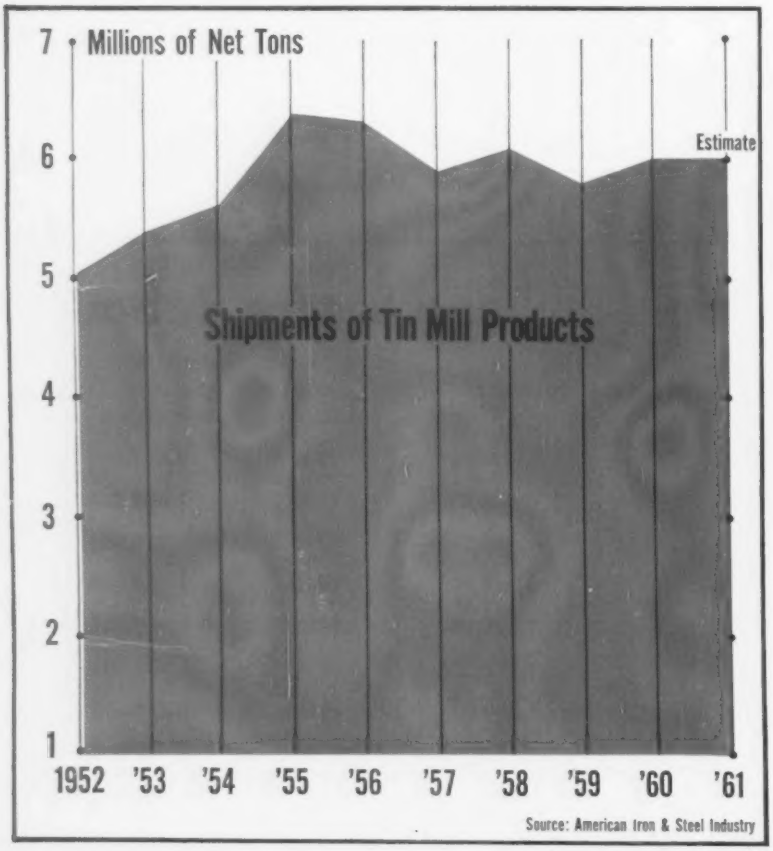
Both programs will hit tin mills with their own transition to thin tinplate still in a fluid state. All thin stock now being made comes off temporary or converted facilities. In many cases, the mills being used do not have the power or cooling equipment for high-speed production.

Unanswered Questions — Seven specially-designed mills are being rushed to completion. But there is a question how many of these will be in full running order when the rush starts next year. There is also a question as to exactly how thin tinplate should be made. Customers apparently have made up their minds in this regard. But some producers feel more experience will be needed before all technical and economic matters can be resolved.

On demand, there is no uncertainty: Tinplate shipments are due to zoom next year and thin material is headed for a dominant place in the product mix. One can company is shooting for a June 30 stockpile good for 3 to 3½ months. It has placed firm orders through February and expects to make commitments through May in a few days.

The inventory pattern seems uniform. One mill says the biggest can companies have not yet done much ordering for the first half. But they indicate they will be taking eight months supply in six months time.

Watch Out for Next Year



Shipments Up—This year, tinplate shipments over the first eight months were 35 pct greater than shipments in the first six months. More than a million tons went out in the two added months. In 1962, a good part of the summer tonnage will be crammed into the first half.

At the same time, thin tinplate will be moving up strongly. Thin stock could account for 25 pct of tinplate production next year, Jones & Laughlin Steel Corp. said last August. Recently, a J&L spokesman said the early estimate looks conservative. Reports from can companies indicate the same thing.

A Continental Can Co. official thinks nearly 50 pct of the beer cans, more than half the oil cans, and all the non-aluminum citrus cans are being made of thin tinplate.

Other Uses—Central States Can Corp. expects more than 50 pct of

its tinplate cans will be thin stock in 1962. Central States makes general line cans for cleaning agents and other dry products. It is taking only test quantities of tinplate now, but a decision on conversion is due in a few weeks.

One mill is already having problems meeting demands for thin tinplate. New equipment has been ordered but the company is not certain how much thin stock it can turn out next year. Another large producer feels demand can be met if the mills go "pretty much all out for the first six months."

A potential bottleneck centers on the question of speed. Conventional reduction mills for tinplate run between 4000 and 5000 fpm. In normal production, temper or skin mills operate at the same speeds. However, the auxiliary mills must be slowed to about 1600 fpm when they are used to make the second 50 pct reduction needed for thin tinplate. Final output is slowed to this speed when thin gages are being produced.

Tonnage Down — Tonnage of electrolytic lines is also reduced. Turning out stock of half the thickness, they can produce half as many tons in the same time. If coils are coated before final reduction, there is also a loss because the tinplate must be run back through cleaning lines to remove coolant.

Also, tinplate men have been split on the question of how thin tinplate should be produced. One school contended material should be coated before final reduction. They claimed this method gives you the same tonnage from electrolytic lines as with conventional gages. The other faction said stock should be fully reduced before coating. They insisted you get better control of coatings and there is no need for subsequent cleaning if you leave the tinning till last.

The can companies have lined up with the second faction. And that seems to be the direction of the thin tinplate program.

Tape Control Gets A Big Boost

APT 111 enables computer to "tell" a machine how to make a part quickly, easily.

Office computers can be used with the APT method.

▪ Armour Research Foundation has launched a drive to push tape-controlled machine tool use in consumer industries.

Heart of the drive is APT (automatically programmed tools) 111. Released this month, it's the most advanced computer language adapted yet to machine tool control. Simple enough for a good mechanic to learn in a few weeks, it enables a computer to operate a machine tool in the automatic manufacture of critical metal parts.

Until now APT has been confined to the aerospace industry. But Armour is now seeking users in the automotive, farm machinery, shipbuilding and electronics industries. It also has an eye on other mass production uses, such as appliances and plastics molding.

Tool 'Language'—With APT, a computer translates English directions into tool "language" and tells a machine how to make a part, with movements along at least three axes. This saves both money and engineering and manufacturing time in the production of one - of - a - kind parts, tools and dies.

APT 111 began at Massachusetts Institute of Technology in 1952. The Aerospace Industries Assn. has actively aided its development since 1957. With at least 15 sponsors already, Armour Research will seek new ones at $15,000 per corporate sponsor and $5,000 extra for each division the sponsor brings into the program.

APT 111 could be an answer to the growing problem of high speed model changes (The Iron Age, Oct. 12, 1961, p. 123).

Time Saver — Researchers won't say how fast APT 111 can put a new die into a production press or a new diecasting mold into a diecasting machine. But they hint it could cut the time to a matter of hours. They also point out that machinists can easily learn how to feed data into the computer.

Another point that may interest consumer goods makers: Either point-to-point automatic tools, or continuous path machines, are already available that will take APT 111 programming. The language was designed for the IBM 709 and 7090 computers. Almost any large computer can now handle it, and Armour will expand its application to a constantly growing number of computer models. A company already using a computer for other uses already has the major equipment item needed — from a cost standpoint. An estimated 200 IBM 7090 computers are now in use.

Use Art—General Motors' Allison Div. is already familiar with an earlier version of APT, and will follow through on APT 111. Lockheed Aircraft Corp. has three divisions using APT. Bendix Corp.'s Industrial Controls Section, is also in the APT program.

Sunstrand Machine Tool Co. has developed SLIP, their own computer-tool language, that can be used with less expensive computers. IBM's desk size 1620 general purpose computer handles SLIP.

If you can't afford a computer, you can buy time from somebody who does. You send a letter containing specs to a computer center and get a tape back by mail. The advocates say '62 is the year for APT.

Blueprint for a Labor Policy

Group Makes Sweeping Report on the "Public's Interest"

High-level group of labor experts reports on "The Public Interest in National Labor Policy."

Some myths are exploded; other controversial points attacked. Inflation charge hit.

▪ Threats of emergency in labor disputes affecting the national welfare are overrated at the time.

So says a high-level group of labor policy experts after completing nearly two years of study at the request of the Committee for Economic Development. Dr. Clark Kerr, president of the University of California, headed the study group.

The Group—Serving with him were Professors John T. Dunlop and W. T. Elliott of Harvard, Douglass V. Brown and Robert M. Solow of MIT, Albert Reese of the University of Chicago, Philip Taft of Brown, George W. Taylor of the University of Pennsylvania and David L. Cole, a nationally-known arbitrator.

During the steel negotiations in 1959, Dr. Taylor served as chairman of President Eisenhower's Board of Inquiry. He is currently chairman of the Long-Range Committee in the labor agreement between Kaiser Steel Corp. and the United Steelworkers. (Should the Public Take Part in Labor Disputes, IA, March 16, '62, p. 90.)

A Look Back to '59—The group feels there are cases when the President would require operation of only part of an industry during labor talks. This was a controversial point when the Taft-Hartley's 80-day cooling off injunction was invoked during the last steel negotiations.

The Kerr group also recommends more responsibility for Presidential emergency boards. They might serve as mediators and step in before a strike actually started, says the Kerr group. But emphasis would remain on "voluntary agreement" and there would be no power for the President or his board to impose settlement terms.

To improve mediation, the Kerr group urges that labor-management panels be activated on a national and commuuity basis.

Prepare Roster—They would like to see the Mediation Service prepare a roster of "qualified citizens available to complement the efforts of its staff mediators in important or unusually obstinate cases."

The group also probed theories that wage settlements in collective bargaining may help produce and sustain inflation. Their finding: Evidence on union responsibility for inflation is inconclusive. But the group added that "careful consideration" should be given to "the possibility that collective bargaining has contributed to creeping inflation."

Other factors which might contribute to inflation, the group says, are possible biases in official price indexes which do not adequately consider "quality improvements in the products and services priced"; the "exploitation of old monopoly positions" by industry; the "rigid adherence by management to fixed wage-price relationships"; "downward inflexibility of some prices in markets where demand was weak";

High Spots of the Labor Report

Following are key recommendations made by the nine-man report on "The Public Interest in National Labor Policy":

Coercion: Both employers and unions are guilty of it. National policy regarding bargaining in good faith has developed into "an unwarranted intrusion into the business of the parties and a source of voluminous and wasteful litigation."

Mediation: "The prime responsibility for reaching agreement . . . rests with the parties." Government's role should be to assist, partly by providing "high-quality mediation service." The Mediation Service should prepare "rosters of qualified citizens available to complement the efforts of its staff mediators in important or unusually obstinate cases."

Emergency Disputes: Existing procedures for dealing with emergency disputes affecting the national welfare have been used too frequently. Increase the responsibilities of Presidential emergency boards. They might step in before a strike starts and "the respective positions become too frozen."

Inflation: Evidence on union responsibility for it is inconclusive. "Careful consideration" should be given to "the possibility that collective bargaining has contributed to creeping inflation."

Establish an annual Labor-Management Conference on the Economic Report. It would aid in exchange of ideas among labor, management and government leaders.

Automation: Government should help unions, management and individuals meet the problems of transition satisfactorily.

and the "bidding up of salaries of managerial, technical, and scientific personnel not covered by collective bargaining."

Dim View—The group opposes establishment of permanent government machinery to regulate or review wage determinations made through collective bargaining. Members also take a dim view of "appeals for voluntary restraint," but add:

"The parties should re-examine their own interests in the wage determination process to see whether they have not construed them too narrowly and too mechanically."

They propose establishment of an annual Labor-Management Conference on the Economic Report, to be called by the President. Its aim: To aid in exchange of ideas among labor, management and government leaders and to promote the economic impact of collective bargaining.

Automation and Manpower—The Kerr report also makes suggestions regarding automation and the effective use of manpower. One is that government should help unions, management, and individuals meet the transition problems satisfactorily. The group suggests changes in private and public policies to encourage mobility of human resources and to assure that costs of individual mobility are shared by society.

The Kerr group also directs proposals at both employers and unions regarding coercion. It complains of interpretation of law to "employer statements during an organizing campaign." Many, the report says, "appear to us to be coercive. . . ."

Called 'Intolerable'—The report describes as "intolerable" the use of secondary boycotts or pickets aimed at upsetting results of representation election.

National policy with regard to bargaining in good faith has "developed into an unwarranted intrusion into the business of the parties," the group says, "and a source of voluminous . . . litigation."

Top 100 Contractors Concentrate on R&D

Emphasis on high dollar value items gives largest companies more defense contracts.

Missile and spacecraft producers in ascendancy. Aircraft and construction suffer casualties.

■ With 8.5 pct of this year's prime military contracts under its corporate belt, General Dynamics Corp. leads the field of defense contractors as it has done for four out of the past five years. The corporation received $1920 million in military business.

Percentage Up—The 100 top defense contractors and their 118 subsidiaries received 76.2 pct of fiscal 1961's prime contracts of $10,000 or more. The top 100 had 73.4 pct of fiscal 1960's contracts.

Dept. of Defense reports that the proportion of prime contracts awarded for production, and development, and research of major hard goods items has risen from 68 to 78 pct. The Department explains that the increased emphasis on high dollar-value items is the main factor in the higher percentage of awards received by the top 100 companies.

Small Business — Fiscal 1961's figures show that the gradual shift of awards from top companies to smaller contractors has halted, at least temporarily. Small business will continue to benefit from subcontracts.

This year's list reflects current trends in defense spending. The largest turnover from 1960 is in construction companies. Seven of them have dropped from the top ranks. Another change is in the loss of three aircraft companies and the addition of four missile concerns as Defense Dept. moved towards missiles and space vehicles.

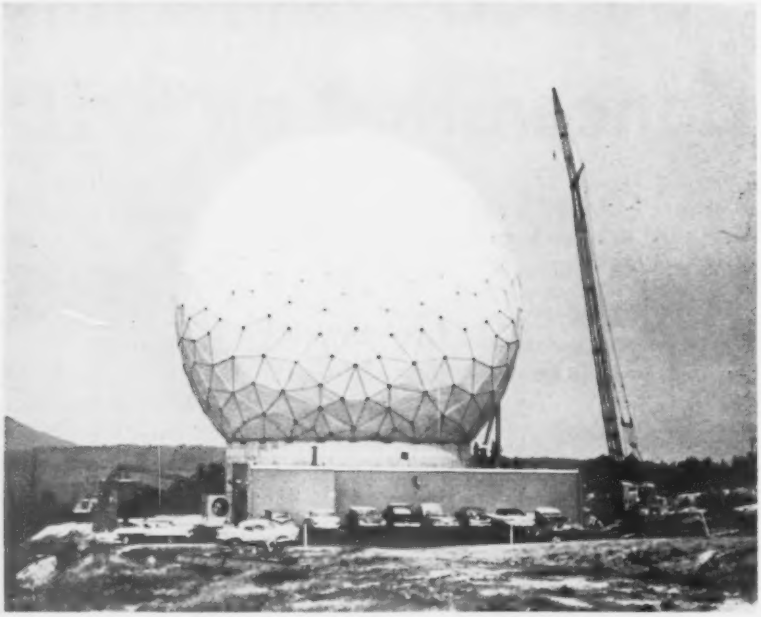
Missiles and Space—The main prime contract work of 62 companies on the list is for research, development, test, and production of missiles and space vehicles, aircraft and electronics.

Top Ten's Portion Rises

(Millions of Dollars)

1960		1961	
General Dynamics	$1260	General Dynamics	$1920
Lockheed Aircraft	1070	North American Aviation	1197
Boeing Airplane	1008	Lockheed Aircraft	1175
General Electric	963	Boeing Airplane	920
North American Aviation	907	General Electric	875
The Martin Co.	596	The Martin Co.	692
United Aircraft	517	United Aircraft	626
American T&T	466	American T&T	551
RCA	405	Sperry Rand	408
Douglas Aircraft	404	RCA	392

New Radome Protects Radar Antennas



SPHERICAL GUARD: North American Aviation, Inc., has developed a new type of radome to protect Air Force radar antennas from weather and electronic interference. The Columbus Div. has built two of the spherical aluminum and fiberglass radomes, each 110 ft in diam, and so precisely engineered that one can be assembled in only 19 working days.

Superior Acquires Copperweld Div.

Superior Steel Corp., a Delaware subsidiary of Fulton Industries, Inc., is acquiring the Superior Div. of Copperweld Steel Co., Pittsburgh.

Superior Steel Div. manufactures and sells cold-rolled and hot-rolled strip steel in stainless, alloy, spring steel, clad metals and special products. It has a sales volume of approximately $20 million annually. Fulton's annual sales volume is approximately $50 million.

Finished Steel Shipments Drop

Finished steel product shipments direct from mills in the first 10 months this year dropped from the same period of 1960.

Shipments to October totaled 54.579 million net tons in 1961. Last year, they totaled 62.544 million net tons, American Iron & Steel Institute reports.

Automotive took 18.1 pct of the total shipments in the first 10 months of 1961, compared with 20.3 pct in 1960. The drop matches the decline in auto production this year and shows up in cold rolled sheets shipments. They fell from 12.697 million tons in 1960 (or 20.3 pct of the product total) to 9.698 million tons (or 17.8 pct of the product total) in the first 10 months of this year.

B & L Opens New Cold Finished Bar Plant

Bliss & Laughlin, Inc., Harvey, Ill., has opened a $2 million cold-finished bar plant at Medina, O. It has a capacity of 25,000 tons per year.

Fred Robbins, B & L president, notes that Ohio is now the third largest cold finished steel consuming area. About 60 pct of the state market is in the Cleveland area.

B & L now supplies 18 pct of the U. S. market, according to American Iron & Steel Institute reports for the first 10 months of 1961. At the Medina plant, maximum sizes will be 2½-in. for rounds, squares and hexagonals, and 1x4-in. for flats.

A new maximum surface roughness (RMS) was also announced by Bliss & Laughlin. Two surfaces, 5RMS and 8RMS, can be chrome-plated without intermediate operations.

New Defense Work

The Navy has ordered three new nuclear submarines. Contracts totaling $84 million went to: Electric Boat Div., General Dynamics Corp., Groton, Conn., $26.371 million; Bethlehem Steel Co., Quincy, Mass., $28.456 million; Ingalls Shipbuilding Corp., Pascagoula, Miss., $29.5 million.

It will bring the total nuclear subs contracted for to 32, excluding Polaris types.

Baldwin - Lima-Hamilton Corp., Philadelphia, received a $15.486 million Army contract for 13 hydraulic turbines. They will be used in power plants of two dams being built in the Pacific Northwest.

Congress Studies Interstate Tariffs

Interstate tariffs, while not raising a furor like international tariffs, are bothering Congressmen. A Congressional study of the problem may lead to changes in state taxation of interstate commerce.

A special House Subcommittee studying the problem has been asked by industry representatives to exempt corporations from a state's taxation unless the firm maintains a "permanent establishment" in that state.

Under a law enacted last year a company is exempted from income taxes in states where it does no more that solicit orders for sales. But industry representatives believe the law doesn't go far enough. They seek further exemptions in income, sales and use taxes.

A NEW ADVANCE IN DURABLE FLAME RETARDANT WORK CLOTHES

It takes the optimum combination of fiber, fabric, and finish to make the best possible fire retardant work clothing . . . and this combination has been achieved in a new *Mount Vernon Safety Fabric.*

The fiber is cotton – the world's most comfortable fiber: cool, absorbent . . . with no static electricity and no melting at high temperatures.

The cloth is a MOUNT VERNON fabric specifically developed for this use. It is designed for high strength, resistance to tearing and abrasion, and maximum air porosity . . . and to retain these properties throughout the life of the garment.

The finish is Lynrus FR-1*. It chemically combines with the fiber and the cloth to produce *Mount Vernon Safety Fabric.* It provides durable flame resistance that will last for the life of the fabric whether it is laundered or drycleaned. *Mount Vernon Safety Fabric* will not support flame. Afterglow in charred areas is negligible.

Mount Vernon Safety Fabric is mildew resistant, wrinkle resistant, and has bacteriostatic properties which tend to inhibit perspiration odor development. It is non-allergenic, non-irritating, and non-toxic. Because the fabric is soft and flexible, without a trace of stiffness or harshness, it can be styled into smart, comfortable work clothes.

Mount Vernon SAFETY FABRIC

LYNRUS F.R.1*
Durable Flame Retardant Finish

These claims are supported by scientific tests; use the coupon to write for your copy of "Technical Facts About *Mount Vernon Safety Fabric.*"

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40 Worth Street, New York 13, N. Y.

I am interested in knowing more about MOUNT VERNON SAFETY FABRIC. Please send me:

☐ a copy of "Technical Facts About MOUNT VERNON SAFETY FABRIC."

☐ a swatch of MOUNT VERNON SAFETY FABRIC, so I can test it myself.

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Company_____

Address_____

City_____ Zone____ State_____

INDUSTRIAL BRIEFS

Grinding Wheel Institute—At the fall meeting of the Grinding Wheel Institute, officers and directors were elected for 1962. W. G. Pinkstone of A. P. de Sanno & Son, Inc., was elected president. C. F. Leitten of Electro Refractories & Abrasives Corp., was named vice president, and L. A. Patt, of The Carborundum Company is the new chairman of the board.

BDSA Promotions — The Business and Defense Services Administration has promoted three career employees to top posts. B. D. Kaplan becomes director, Building Materials and Construction Industries Div.; Donald Sham becomes director, Miscellaneous Metals and Minerals Div.; and O. C. Reynolds will be director of the Containers and Packaging Div.

NEW INKS FOR METALS RESIST 2500° HEAT

Formulated for use on steel, copper, brass and welding rods.

Ideal for insuring permanence of identification marks and specifications in all types of metalworking, especially where heat-treating is involved. This new product resists heat up to 2500 Degrees Fahrenheit.

Technical data, based on extensive lab and field tests now available.

Write For Details

F. G. OKIE, INC.

INK SPECIALISTS

AMBLER, PENNSYLVANIA

EJC Officers—Dr. E. A. Walker, president of Penna. State Univ., was elected president of the Engineers Joint Council for 1962. L. R. Howson of Alvord, Burdick and Howson, was elected vice president.

Castings Officers—The Iron Castings Producers Group has named its 1962 officers. James Crowley of Pioneer Foundry Co., is president and R. W. Jordan of Hamilton Foundry, Inc., is vice president.

Lippmann Purchase — Hewitt-Robins, Inc., of Stamford, Conn., has voted to acquire the business and manufacturing equipment of Lippmann Mfg. Works, Inc., and its related firms in Milwaukee.

Tungsten Prize—The K. C. Li Medal and Prize for advancing the science of tungsten was awarded at Columbia University. Gold medals and $1,000 prizes were awarded to G. H. Clewett, L. E. Sausa and L. P. Twitchell.

International Expansion — Reynolds International, Inc., Hamilton, Bermuda, has acquired Aluminum Extruders Ltd. Kruger Organization Ltd., Montreal, had owned Aluminum Extruders Ltd.

Increases Laboratory — Formsprag Co. has completed an expansion program which increases its laboratory facilities investment to one-quarter of a million dollars.

Elion Moves—Elion Instruments Co. has moved from Bristol, Pa., to a new 17,500 sq ft plant in Burlington, N. J. Elion produces highly scientific instruments for the metalworking and other industries.

Handling Conferences—The Material Handling Institute, Inc., and the American Material Handling Society, Inc., have established a national steering committee. Its responsibility will be to create technical conferences of a high professional nature.

Ski-Lift Rope — Colorado Fuel and Iron Corp. has developed a "moly" drawn wire process to improve its ski-lift rope. Lubrication problems have been eliminated by covering each strand with a film of molybdenum disulphide.

Philadelphia Plant — Caine Steel Co. recently dedicated a plant containing fabricating and warehousing space in northeastern Philadelphia. The flat-rolled metals distributor will move into the new quarters in May of 1962.

Moscow Delegate—E. J. Schneider, vice president of Engis Equipment Co., has been appointed an American delegate for the International Organization for Standardization meeting being held in Moscow this week. Mr. Schneider will join the Technical Committee on Surface Finish at the meeting.

Seley Awards—E. G. Plowman, vice president, traffic, U. S. Steel Corp., has been named to receive the 1961 Seley Awards from the Transportation Association of America.

Scotch Manufacturer — F. J. Stokes Corp., Philadelphia, has an agreement with the Scottish firm of Vacuum Industrial Applications Ltd., Wishaw, Lanarkshire, to produce Stokes-designed vacuum induction melting furnaces and vacuum stream-degassing systems.

ALTAPEM Dissolves—The Association of Lift Truck and Portable Elevator Manufacturers has dissolved. Its nine members have joined the Material Handling Institute, Inc.

German Subsidiary—The Beryllium Corp. has formed a wholly-owned subsidiary to market its copper products throughout West Germany. It will be located at Bad Homburg.

Toronto Plant—Plans for a 20,000-sq ft plant have been announced by Premier Fastener, Ltd. The company is a division of Premier Industrial Corp., Cleveland.

N-S Strip Steel...

The thinness of fine paper—produced by fast, modern rolling mills, precision slitting, polishing and finishing equipment. Athenia Steel Division produces tempered spring steel, annealed strip, flat wire, stainless strip and valve spring wire, offers experienced technical service for your special requirements.

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NATIONAL-STANDARD COMPANY

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Quantity PRODUCTION *of* GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND FOUNDRY

DIVISION OF GORDON STREET, INC.

MAIN OFFICE AND MANUFACTURING PLANTS

CHATTANOOGA 2, TENNESSEE

How U.S. Management Regroups

Management organization is going through what amounts to an organizational revolution.

It has resulted in new concepts of the staff and even of the president's office.

■ Under the impact of increased competition, growing technical change and marketing problems, U. S. management is regrouping.

Expansions, mergers, and acquisitions are also acting to bring corporate change. The revamping is simply an effort to get more effective operation of larger, more complex businesses. Companies must serve new markets, produce new products and operate in a changing legal and economic climate.

A new study by the National Industrial Conference Board shows what's happening. It's based on an analysis of the corporate organization of 61 companies in a variety of manufacturing and service industries.

The NICB study points out these new structural patterns:

(1) A more concerted move to divisionalized organization. This is accompanied by greater decentralization.

(2) An expanding role for the corporate staff.

(3) Emerging of another level of executives, commonly labeled "group executives."

(4) Fuller development of the chief executive's office.

As companies move into new fields of operation, says the NICB, the more traditional, functional-type of organization often has difficulty. As a result, a growing number of companies have grouped functions on a product basis. In addition, they are delegating responsibility for coordinating this effort through the head of a product division.

The aims: Giving adequate emphasis to different product lines, identifying profitability more easily, creating greater flexibility of operations, and increasing the company's ability to compete in a variety of markets.

Changing Staffs—In many companies, the NICB notes, some staff areas are now appearing for the first time at the corporate level. These include: Community relations, stockholder relations, computer technology, research, marketing and marketing research, organization and long-range planning, and management services.

This expanding role of the staff results in a shift in emphasis. The staff is moving from a service agency to an agency assisting the chief executive in planning and control.

New VP's — As companies increase their number of product divisions, coordination becomes a more difficult problem. One organizational solution: Creating executive vice-presidents to ease the president's load. This—and similar developments—have been spurred by the increased demands on the chief executive's time and greater interaction between divisions.

It's Different in Europe

■ This seems to show the U. S. manager can junk inadequate methods when necessary. But what about his European counterpart? How effective are his management techniques?

They could be improved if European company presidents could delegate more and use more decentralization.

This was one of the conclusions after a course for chief executives held at the Management Centre/Europe in Brussels. The Management Centre/Europe functions under the International Management Association, an affiliate of the American Management Association.

Less Advanced — Some of those taking part suggested European higher management personnel are less advanced in their training than those in the U. S. There's also a feeling that functions of management at different levels are less specialized.

Because of this, European top executives feel it necessary to take a very strict hold on the different functions of their companies. This often prevents giving as much time as Americans do to dynamic leadership.

Traditionalists — One European president, commenting on flexibility, said, "We tend to be traditionalists, to be conservative. We don't tend to be flexible and change our ideas with social changes — and other changes—that are taking place. The thing I notice is the speed with which the good American president reacts to these circumstances and gets out and does something about them."

OOPS! Furnace down! Pouring schedule imperiled!

Maybe our cartoonist exaggerated the effect of this news on the Inductotherm offices, but at least he gives you the general idea.

Trouble doesn't often develop in Inducto high frequency induction furnaces. When it does, however, Inductotherm believes in doing something constructive about it—and pronto!

Here, in the customer's own words, is what happened:

"Inductotherm's 24-hour service saved our casting schedule,"

says SAM MINIEA, President, Truecast Precision Casting Corporation, Louisville, Kentucky.

"We were working a 24-hour, 7-day week schedule when our only melting furnace started delivering only half power. A hurried call to Inductotherm brought an engineer to our plant Saturday morning to diagnose and repair trouble in a loose rheostat brush. Thanks to this service expensive down-time was less than 24 hours."

Helpfulness on melting problems and the promptest kind of service to large and small customers alike is a big part of Inductotherm's concept of doing business—that plus a complete line-up of the finest kind of furnace equipment we know how to build. And it all adds up to saving you money. For the entire story, why not talk with an Inducto furnace engineer soon! Inductotherm Corporation, 10 Indel Avenue, Rancocas, New Jersey.

INDUCTOTHERM

Subsidiary for 60-cycle melting equipment—INDUCTOTHERM LINEMELT CORP.

A Million Truck Sales in 1962?

Some Truck Builders Predict Record Sales Next Year

Estimates of others are more conservative.

But most expect both volume and sales in 1962 to top this year's 1,112,000.
By A. E. Fleming

▪ Evidence is piling up that new car production and sales will be very good in 1962.

Things don't look bad for trucks either. In fact, prospects seem very favorable for high-level truck operations in the coming year.

Volume Down—There has been little to shout about this year. About 1,120,000 trucks will be built by domestic producers in calendar year 1961. This is well below the 1,980,000 volume of 1960.

Sales slumped this year, too. Units sold will hit 900,000 compared with 943,000 a year earlier.

But automotive officials forecast more business in the next 12 months. They think that sales might reach the 1 million mark. Some see the figure going even higher, perhaps to a new record.

Among the most optimistic forecasts for the coming 12 months was that of E. N. Cole. Just before rising from general managership of Chevrolet Div. to his present post in charge of General Motors car and truck divisions, Mr. Cole predicted a market for 1,150,000 new truck sales in 1962. Joining him in this prediction was C. J. Werner, general manager of GMC Truck & Coach division.

Somewhat less bullish is Ford division's general manager, L. A. Iacocca, who holds the view that truck sales will top 950,000 in 1962. Others at Ford think that the count will range in the 950,000 to 1 million area.

Not Bad Year—Although 1961 truck production will fall around 80,000 lower than 1960, this year was not a really poor year as truck output goes. Scores during the past 10 years have been: 1959—1,123,000; 1958 — 870,000; 1957 — 1,083,000; 1956—1,103,000; 1955 — 1,245,000; 1954 — 1,022,000; 1953 — 1,209,000; 1952 — 1,223,000.

Out of almost a dozen major manufacturers, only three will show production boosts over last year. They are Ford, White and International. The first two will build just slightly more than last year, with International going perhaps 20,000 over 1961.

Jeep Business Booms

Production and sales have reached an all-time monthly high at Willys Motors, Inc.

Vehicle deliveries continued at a record pace, following an all-time monthly sales peak in October, the company said. This month the firm expects to produce 20,000 Jeeps for another new monthly record.

405 Hp Engine

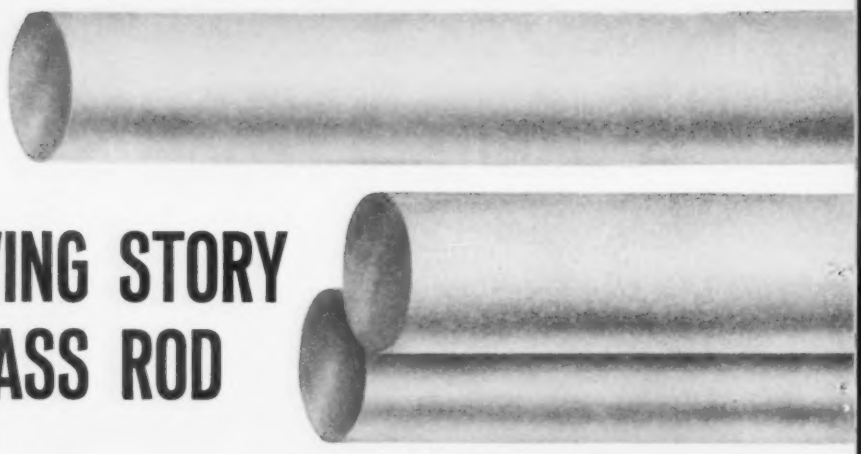
Ford is expected to announce this month availability of the most powerful Ford engine ever produced.

Offered in the Galaxie series, it will be a V-8 rated at 405 hp with 406 cu in. displacement.

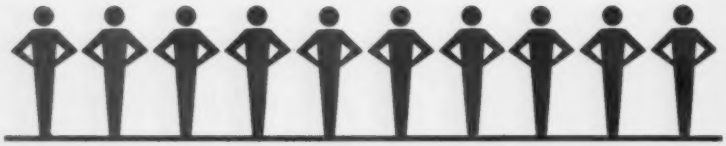
Car's Windows Go Way Up

FLIP-UP: Flitewing, Dodge's new $125,000 idea car, has flip-up windows that move upward automatically when car's doors are opened.

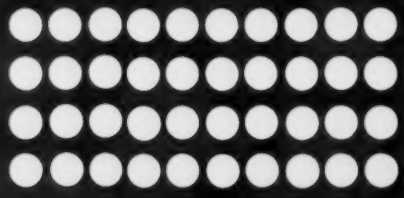
A GRAPHIC, MONEY-SAVING STORY OF REVERE BRASS ROD



BEFORE using Revere Brass Rod



10 INSPECTORS



REJECTS RAN AS HIGH AS 40%

AFTER using Revere Brass Rod

2 INSPECTORS

ONLY 6 REJECTS IN 30,000 PIECES

A prominent manufacturer of electronic gear was having difficulty with wafer-like brass discs used to maintain the fidelity of tone in its equipment. Rejects were running as high as 40% and a staff of ten inspectors was needed to keep tabs on these seemingly-minor parts.

Revere's Technical Advisory Service was called in for consultation with the manufacturer's engineers. Working together, they found the reasons for the high rejection rate . . . ordinary free-cutting brass rod from which the discs were cut, just couldn't do the job properly. Likewise they found the solution.

Rigid control of molecular structure of the alloy . . . "kid glove" treatment at the Revere mill . . . careful quality control all down the line . . . these produced a brass rod that cut the number of inspectors from ten to two and the rejects from as high as 40% to a startling low of six pieces in 30,000!

Although this rod has a premium price tag, such great savings per-unit are possible that even the most exacting purchasing executives have been unable to work out a better way to handle the problem.

This story is typical of the kind of savings that can be realized when you work hand-in-glove with your suppliers. It shows how higher first costs sometimes can be made to become lower final costs. Why not bring *your* metal problems to Revere for solution?

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COPPER AND BRASS INCORPORATED

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Executive Offices: 230 Park Ave., New York 17, N. Y.

Mills: Rome, N.Y.; Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford and Plymouth, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities.

Distributors Everywhere

North American Gets Moon Job

$400 Million Contract Awarded for 3-Man Space Craft

North American Aviation, with a $400 million contract, will kick off a $20 billion U.S. race to the moon.

NA will build a three-man space craft for Project Apollo but many other companies will share in the prime contract.
By R. R. Kay

■ The aerospace industry on the West Coast is basking in the sun.

One-third of the industry's work is in research and development. But it's moving at a fast pace—from volume production of aircraft to custom-made sophisticated weapons and space systems.

Project Apollo — One project alone, Apollo, may run as high as $20 billion. This is the National Aeronautics and Space Administration's scheme to put a U. S. man on the moon.

Project Apollo just took a giant leap toward space. A $400 million contract went to North American Aviation's Space and Information Systems Div., at Downey, Calif., for a three-man spacecraft.

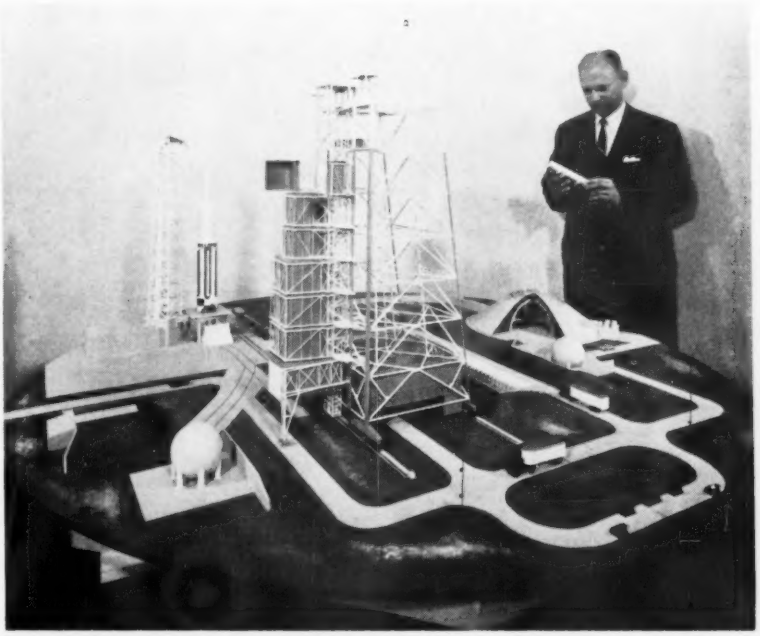
President Kennedy pointed up the boldness of the project in a message to Congress: "No single space project will be more exciting or more impressive, or more important for the long range exploration of space; none will be so difficult or expensive to accomplish."

Timetable—Here's the man-on-the-moon timetable: Development flights, 1962-1964; earth orbits, 1964-1965; moon orbit, 1965-1967; moon landing, 1970. Some think the landing could be made by 1967-1968.

Apollo's design uses the building-block concept. Modular sections will include a command center for the three-man crew; housing for fuel, electrical power supplies, propulsion units; and a third part for decelerating rockets.

Company Lineup — Here are some of the subcontractor companies on North American's team: AiResearch Manufacturing, the environmental system; Collins Radio, for communications; Minneapolis-Honeywell, flight control; and Radioplane Div., Northrup Corp., for the recovery system.

That's only the beginning. Companies all over the U. S. will share in the Apollo program.



SPACE COMPLEX: Giant multiple-stage Saturn rockets will be launched from Saturn Complex 37, now being built at Cape Canaveral. It will be the nerve center for Apollo, the U. S. space exploration project. H. E. Matson, U. S. Steel Corp. market development representative, inspects a model of the Saturn Complex. Service tower will be 356 ft high.

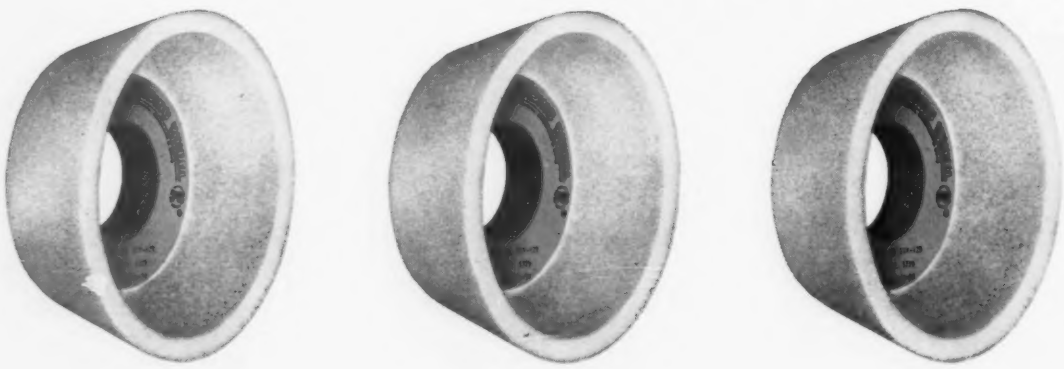
Kaiser Steel Expands Eagle Mountain Mine

Kaiser Steel Corp., Oakland, Calif., hopes to squeeze more iron ore out of its Eagle Mountain Mine in the San Bernardino Mountains of southern California.

Its concentration plant there is in for a major expansion.

Kaiser Engineers are doing the work. It's adding magnetic separation facilities in the jig plant, expanding the heavy media plant, putting in a new tailings disposal system, extending loading facilities, and modifying control systems.

POSITIVE DUPLICATION—EVERY TIME!



Music to please you is identically reproduced by these three hi-fi records pressed from the same master recording. The three toolroom grinding wheels (above) will also please you with their masterly Positive Duplication. That's because they are CINCINNATI (PD)° GRINDING WHEELS.

FAMOUS, UNIQUE (PD) PROCESS

Unique in the industry, the famous Cincinnati (PD) manufacturing process is governed by 36 unvarying quality control steps. Print-weigh tickets, for example, must match the weights for every mix—*exactly* as specified on the Master Card which controls every operation in the rigid procedure.

UNIFORM, PREDICTABLE PERFORMANCE

This extraordinary attention to manufacturing detail results in wheels of unsurpassed uniformity.

You can reorder CINCINNATI WHEELS with confidence, because they give you the same good job time after time after time. You use fewer (PD) wheels because they last longer.

CALL CINCINNATI TODAY

Factory trained by the Cincinnati Milling Machine Company, our grinding specialists are available to you for consultation on all your grinding problems. Call your CINCINNATI GRINDING WHEELS Distributor, or contact us direct, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI°
GRINDING WHEELS

°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

New Gage Speeds Checkouts

Cylinder Bore Unit Checks, Records Automatically

A new cylinder bore gage now speeds checkout of test work.

It gives an accurate pulse of condition of cylinder before assembly, and an accurate plot of the life-wear pattern.
By R. H. Eshelman

▪ More accurate and automatic gaging is a growing demand in metalworking.

A unique development that may prove applicable to many areas of manufacturing recently grew out of advanced engineering and design work on diesel engines. The company is Continental Aviation and Engineering Corp.

Current military success with multi-fuel engines stems from ingenuity in test and experimental work. Continental's new cylinder bore gage is a prime example.

Checks Cylinders — Developed cooperatively with Sheffield Corp. engineers, this device checks and records automatically, bore diam and wall profile of cylinders. Further, it reads out measurements to within .0002 in.

Why the urgent need for such an instrument? Don Mott, manager of the Continental plant, notes military hp requirements are skyrocketing. But in tanks, trucks as well as planes, you must hold the lid tight on weight. In other words, more power from the same package.

Close Watch — "We've got to watch cylinder bore tolerance and bore shape closely," says Mr. Mott. "It's of utmost importance with higher hp output per cu in. of cylinder displacement."

Getting greater power from the same size cylinder requires more stress on the walls. So, very accurate records are needed, both of the cylinder as originally manufactured, and throughout a life cycle.

Previously, checking dimensions was a tedious and time-consuming job. With available instruments the operator made a setting for each point. Then he noted the reading. This opened many choices for human and equipment errors.

Gage Has Job — Now the new gage takes over depth location and recording.

The operator sets the gage head with a master. Then he places the gaging spindle (with head unit and V-locators) in the cylinder, places the spindle in the top position.

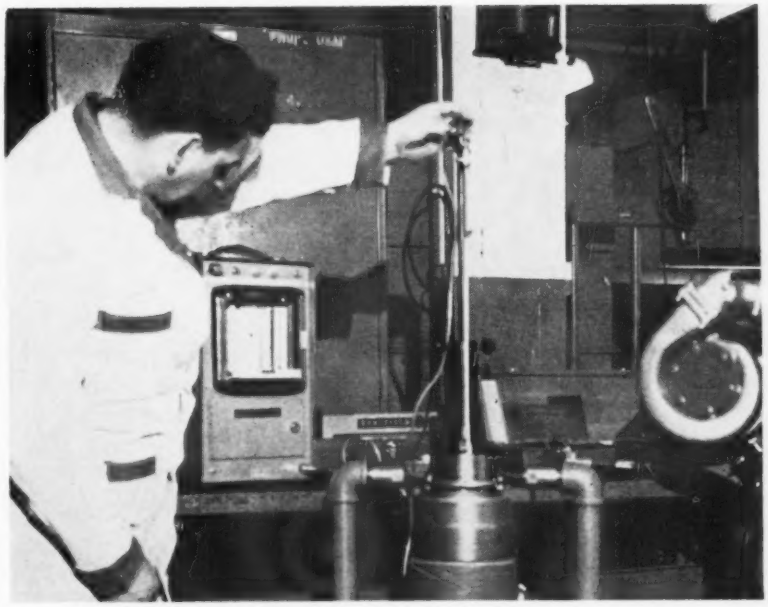
He can take intermittent readings at regular intervals, at every in., merely by pressing an intermittent button. Or he can set the pneumatic recorder to check and graph the wall in a continuous line on the chart. The chart reads tolerances, plus or minus from the original setting.

Each reading is an actual cylinder diam at that point.

Speeded Checkout—Big advantage to test and design engineers is the speeded checkout of test work. Every hour and day is vital, especially on military programs.

With the new gage, companies can get an accurate pulse of condition of a cylinder bore before assembly. They can quickly secure an accurate plot of the life-wear pattern.

Continental next plans to check cylinder bores in hot or operating condition. Choke should provide allowance for cylinder expansion when hot. Now design engineers can find out how close they have come to the ideal.



TIME SAVER: Accurate Sheffield air gaging head takes hairline measurement of single-cylinder bore for new Continental diesel engines.

MEN IN METALWORKING

W. L. Fenn, elected chairman of the board, Fenn Manufacturing Co.

Burgmaster Corp.—William McAvay, named vice president, sales; John Morris, appointed sales manager; Phil Denu, appointed Eastern office manager.

De Laval Separator Co.—G. F. Wheelwright, elected vice president, sales, Industrial Div.

Joy Manufacturing Co.—C. G. Strang, elected financial vice president and member of board of directors.

Weirton Steel Co.—W. W. Hanahan, appointed asst. to the president, in charge of special engineering projects.

Farrell Manufacturing Co.—R. L. Dicke, named president and general manager.

Stackpole Carbon Co.—H. C. Stackpole, elected president; G. E. Ritter, elected executive vice president; B. F. Goodrich, elected secretary.

United States Steel Corp.—J. B. Copper, named vice president, personnel services dept.; W. P. Jones, named vice president, personnel services dept.; J. L. Turner, appointed asst. to executive vice president, personnel services; Dr. R. B. O'Connor, named vice president, health services; W. W. Gustafson, appointed asst. manager, Pittsburgh district sales.

U. S. Industries, Inc.—H. E. Hayne, appointed vice president, marketing, USI Robodyne Div.

Reynolds Mining Corp.—S. P. Wimpfen, elected vice president.

International Ultrasonics, Inc.—C. A. Lydecker, appointed asst. to the president.

Gulf & Western—J. H. DeVries, named vice president.

Norton International Inc.—Dr. W. F. L. Place, appointed vice president in charge of European operations.

Rudolph Smith, elected executive vice president, Colorado Fuel & Iron Corp.

Mack Trucks, Inc.—G. W. Brooks, named vice president and director of marketing.

Rockwell Manufacturing Co.—Col. A. R. Cyr, named executive vice president.

Superior Industries, Inc.—J. F. Henry, named vice president and general manager; H. W. Pritchard, named general sales manager; Dewayne Osborne, named controller.

Johnson & Hoffman Manufacturing Corp.—Julius Zinn, elected vice president.

Metal & Thermit Corp.—Carl Gloskey, appointed general manager, Chemical Div.

(Continued on P. 104)

R. E. Nelson, elected president and a director, American Gilsonite Co.

P. C. Ely, appointed vice president, operations, National Tube Div., United States Steel Corp.

S. A. Crabtree, appointed vice president in charge of sales, Republic Steel Corp.

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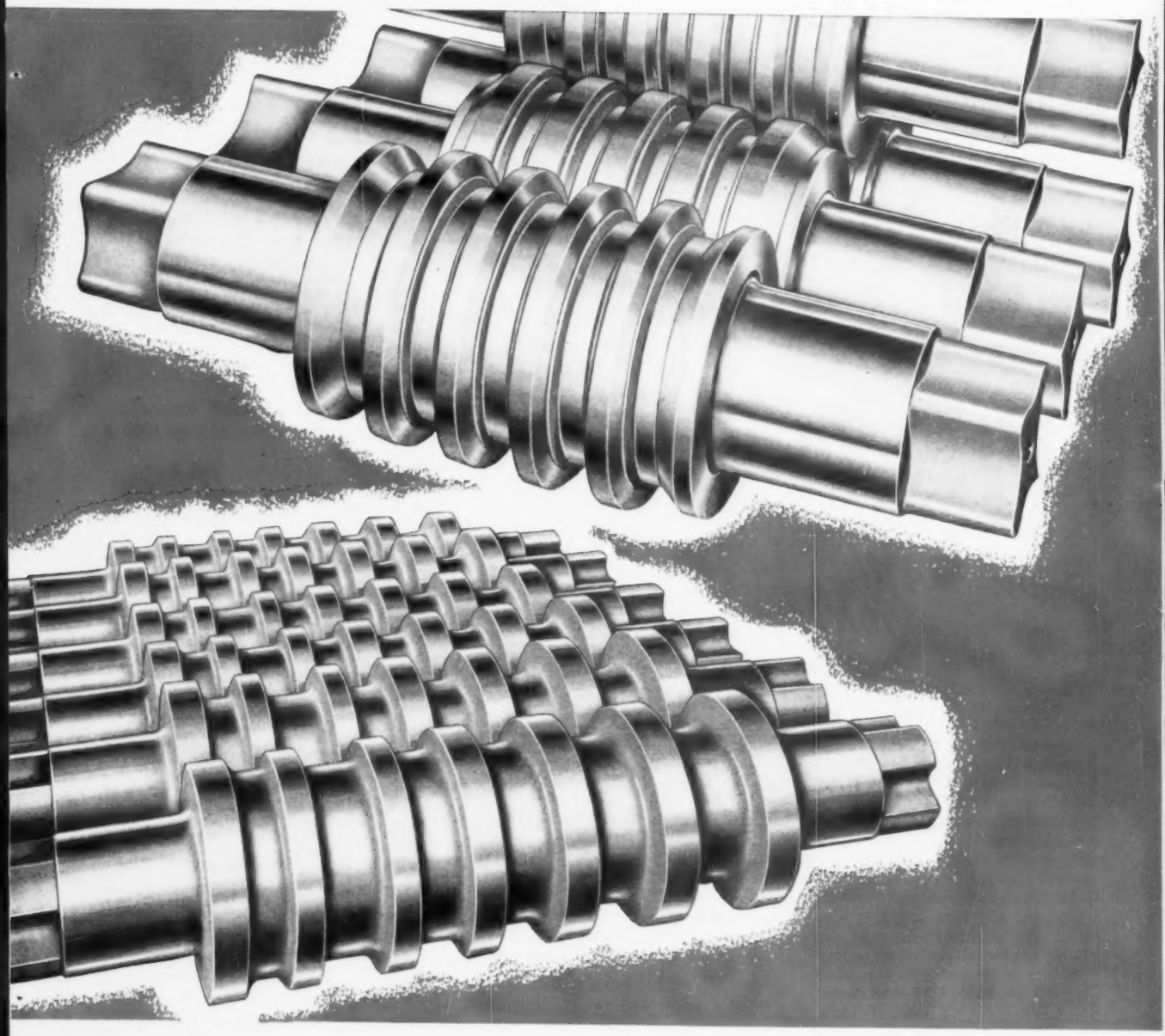

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LAMSON

LAMSON CORPORATION

(Continued from p. 102)

Latrobe Steel Co.—D. I. Dilworth, Jr., named staff officer.

Edgcomb Steel of New England, Inc.—J. C. Ahearn, named product manager, carbon steel.

Advanced Vacuum Products, Inc.—F. L. Yarrington, Jr., named sales manager.

Air Reduction Sales Co.—W. W. Littlefield, named manager, Arlington district.

E. W. Bliss Co.—R. E. Rassel, appointed Detroit district sales manager, Press Div.

Link-Belt Co.—H. F. Kurz, appointed manager, distributor and warehouse sales; E. C. Burg, named distributor representative.

Polymer Processes, Inc.—R. R. Sharetts, appointed manager of whirlclad systems engineering.

I-T-E Circuit Breaker Co.—J. I. Ykema, named manager, circuit breaker section, Switchgear Div.

DeVlieg Machine Co. — S. W. Meyers, named works manager.

Macwhyte Wire Rope Co.—W. H. Myers, named asst. sales manager.

Harbison - Walker Refractories Co.—W. B. Lewis, appointed manager of general sales office.

Holley Carburetor Co. — P. R. McCarrey, appointed to original equipment manufacturers sales group.

General Electric Co. — W. J. Dugan, appointed manager of marketing, chemical materials dept.

Motorola Communications & Electronics, Inc. — Wilford Shurtleff, named microwave sales manager; W. P. Herbold, named microwave industrial communications representative.

Waterbury Farrel Foundry & Machine Co.—G. M. Elliott, named district sales manager.

Stauffer Chemical Co. — A. J. Lelik, named production supervisor, Stauffer Metals Div.

E. W. Bliss Co.—W. B. Flanigin, appointed manager of sales and marketing.

Caloric Corp. — Robert Lawrence, named director of marketing.

Avondale Shipyards, Inc.—Roy Perrin, appointed director of purchases.

Brown & Sharpe Mfg. Co.—J. F. Hines, named director of milling machine sales and federal government sales; R. C. Smith, appointed district sales manager, Mid-Atlantic territory. Both of Machine Tool Div.

Timken Roller Bearing Co.—H. A. Beidel, appointed asst. to the managing director, Timken France plants.

Meissner Engineers, Inc.— R. B. Vogeler, named director.

Motorola Inc. — Marlin Kroger, appointed associate director of research and development, command and control systems, Military Electronics Div.

Pratt & Whitney Co., Inc.—E. E. Kirkham, named manager, system engineering section; H. W. Meyer, appointed manager, plans and technical section; M. H. Sluis, appointed manager, electrical design section.

American Sealants Co.— R. G. Witteman, appointed chief application engineer.

United States Steel Corp.—H. H. Kelso, named chief engineer, and J. A. Campbell, named asst. chief engineer, Fairless Works.

Westinghouse Air Brake Co.—Myron Hawley, appointed manufacturing manager, Industrial Products Div.

H. M. Harper Co.—J. A. Stevenson, named assistant general sales manager, Metals Div.; J. L. Mengel, appointed assistant general sales manager, Fastener Div.

Volkswagen of America—P. R. Davis, named manager, special projects; P. R. Lee, named manager, marketing dept.; Helmut Schmitz, named national advertising manager.

W. T. Ingram, elected vice president, Reynolds Metals Co.

Union Carbide Corp. — H. P. Rassbach, named general manager, sales development and metallurgical service, Union Carbide Metals Co.

Twin Coach Co.—George Bullen, named general manager, Special Products Div.

Sparton Corp.—G. R. Jordan, appointed market analysis manager.

Nylok Corp. — F. A. Simmons, appointed sales manager; E. F. Brautigam, appointed manager, midwest facility.

Lindberg Steel Treating Co.—M. J. Wilms, named sales manager.

Kaiser Aluminum & Chemical Corp.—E. W. Fish, named building products manager.

Keystone-Seneca Wire Cloth Co. —W. B. Kempton, named director of sales.

Hyster Co. — J. W. Morgan, named domestic sales manager, Tractor Equipt. Div.; Graydon Broms, appointed assistant sales manager, Tractor Equipt. Div.

Foxboro Co.—R. W. Corson, named asst. treasurer.

Cohu Electronics, Inc. — H. M. Bailey, named resident sales manager, Kin Tel Div.

Pittsburgh-Des Moines Steel Co. —Dale Hardy, named sales manager, Seattle; R. L. Marshall, named sales manager, Provo district.

(Continued on p. 106)

LAMSON CONVEYORS

when orders come in but can't get out...

LET LAMSON ENGINEERS show you how to speed materials through your plant without adding personnel or enlarging current floor space.

Conveyor units alone are not enough. Units must be moulded into a conveying system designed to accomplish certain objectives. And, system efficiency depends on the expertness of system design.

Only high engineering skill plus long experience in materials handling can guarantee a successful operation. Both characterize the LAMSON record of achievement that goes back 80 odd years.

LAMSON engineers have become famous for providing "Turn Key Jobs" . . . a complete service that includes system design, component installation, user-personnel training, critical operational checks and the assumption of full responsibility.

So . . . if your orders are not hitting the dock on time, check LAMSON. For full information about LAMSON conveying systems, write to 104 Lamson Street, Syracuse, New York.

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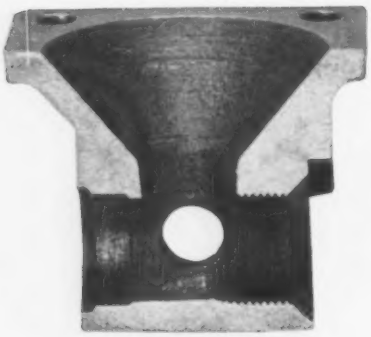

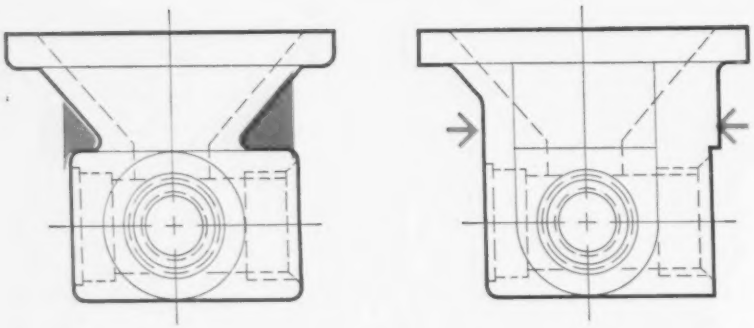

REDESIGN CUT COSTS

A CASE IN POINT—Hamilton Foundry engineers suggested a single design change which saved over 50% in pattern costs and cut the unit price 28% on the quantities ordered.

Curtis Automotive Devices, Inc. uses this casting on their DYNA-FOG® Insecticide Applicator. As initially designed, the part had an undercut which required cores in the mold. Hamilton Foundry's engineers suggested a simplified design which eliminated the cores and made dramatic savings possible in tooling costs and unit prices. You can expect this kind of engineering assistance from Hamilton Foundry.

When buying castings, the skill and integrity of Hamilton Foundry is your best insurance that specifications—and delivery schedules—will be met.

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1551 LINCOLN AVENUE • HAMILTON, OHIO • TWinbrook 5-7491

(Continued from p. 105)

Pittsburgh Steel Co.—G. W. Novak, named oil country engineer; J. D. Smith, named sales representative, Tulsa.

Kennametal, Inc.—Fred Hennig, Jr., named field sales manager.

Hobart Brothers Co. — D. R. Wedge, named Ohio sales representative.

Foseco, Inc. — Jack Parmenter, named manager, Midwest region; Louis Shilling, named technical sales representative, Chicago.

Allied Radio Corp.—M.S. Friedman, named asst. to vice president-general manager.

Clayton Mark & Co.—E. W. Zemke, named regional sales manager, electrical products.

Avnet Electronics Corp. — Jack Rhoads, named Midwestern manager, Shaw Process Development Div.

Michigan Oven Co. — Charles Percival, Jr., appointed Eastern sales manager.

Sylvania Electric Products, Inc.—N. R. Lewis, named Western sales representative, Chemical & Metallurgical Div.

Benchmaster Manufacturing Co.—V. L. Peters and Earl Cannon, named representatives.

Bohn Aluminum & Brass Corp.—S. R. Starnaman, named sales representative.

Macwhyte Wire Rope Co.—C. E. Wheelet, named factory representative.

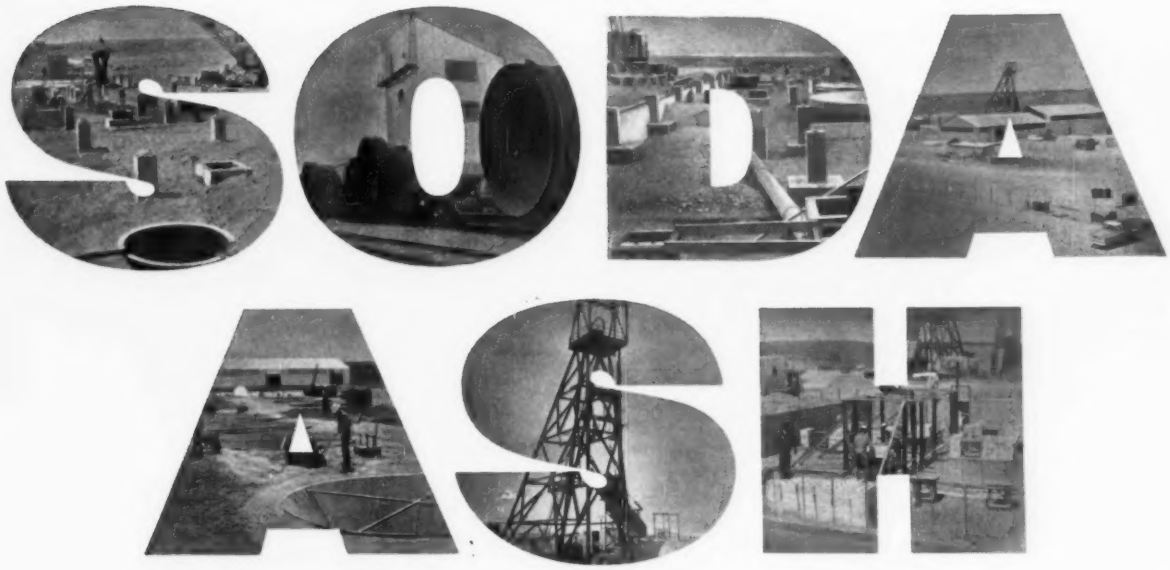
Union Twist Drill Co.—F. D. Tuominen, appointed sales engineer, Butterfield Div.

Adamas Carbide Corp. — Paul Lytle, appointed district manager.

Babcock & Wilcox Co.—R. W. McAndrews, named Gulf Coast sales representative, Tubular Products Div.

Markey Bronze Bushing Co.—Herb Emin, named production manager.

the new Wyoming source of



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The completion of Stauffer's new Wyoming plant to supplement existing West End facilities will expand the market for Stauffer soda ash into areas served traditionally by Stauffer nationwide offices in supplying industrial chemicals. The large traffic department experienced in nationwide distribution problems can effect efficiency and economy in the transport of bulk or bagged soda ash from Stauffer's two natural sources. Let us suggest practical ways you can be supplied economically at your point of consumption. Simply address the coupon below and mail.

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Numerous Conversion Possibilities
Located in San Francisco Bay Area Industrial tract between Pittsburg and Antioch, California
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SEALED BID OPENING JANUARY 17, 1962
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★ Ready to operate Steel Foundry consisting of 31-Foundry, Utility and Administrative Buildings on approximately 41.146 acres. Buildings and equipment maintained in a "ready status." ★ Strategically located in rich Pittsburg-Antioch Industrial Area and adjacent to existing Columbia-Geneva Steel Mill, Shell Chemical Co., U. S. Steel, Linde Air Products, Pacific Gas & Electric, etc. ★ 50 minutes from San Francisco-Oakland Bay Area with easy access via State routes 24 and 4. Proposed freeway will link area with Oakland within a few years. ★ Adequate existing residential area housing industrial workers nearby. . . new residential sub-divisions developing rapidly. ★ Served by Santa Fe Railroad spur track. Located near shipping channels. ★ Attractive Financing.

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You Arbitrate It!

Share and Share Alike

■ With Christmas approaching, the foreman of a small appliance assembly department decided to keep his men on overtime to complete orders for the holiday trade. There were 30 employees under his supervision and he offered each of them five hours of overtime during a certain week.

It didn't occur to him that a plan he considered so obviously fair to all could be the basis of a grievance. But a grievance nevertheless resulted.

Not for Newcomers—"Ten of these men are probationers," the shop steward reminded the foreman. "They're not supposed to get the privileges of seniority until after they have served 30 days. If you've got 150 hours of overtime you have to divide it among the 20 senior employees, giving each 7½ hours. They're the ones entitled to the overtime."

However, the industrial relations director of the company supported the foreman. "A right to share in overtime is not one of the privileges of seniority," he said. "As long as we give all employees an equal opportunity we're conforming to the agreement."

Eventually the case went to arbitration under the rules of the American Arbitration Assn. How would you rule?

The Arbitrator Ruled:

Reading the contract as a whole, the arbitrator said that the right to share in overtime was no more linked to seniority than the right to a paid holiday, for instance. Both were privileges that accrue to employees, regardless of their length of service. So the company won the case.

From the files of
The American Arbitration Association

"**You Arbitrate It!**" appears in the second issue of The IRON AGE each month. Look for it in the January 11, issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

Metal-on-Plastic Films

The Army is interested in a unique solar reflector. Developed by Goodyear, the reflector shows the result of a new technique for rigidizing metal-on-plastic films. It makes possible a practical method for forming accurate mirrors in space. The mirrors would be prepackaged, shot aloft and exploded from the container. A foam rubber backing would become rigid to form the reflector.

PLASTIC FOAM: Holds metal film in place.

Neoprene: Space Contender

Neoprene is getting a closer look for possible use as a space material. Recent high-velocity tests, duplicating the effect of meteorites hitting the hull of a spacecraft, indicate that neoprene registers less damage than any material tested thus far. Now, the problem is to find a material that won't deform when serving as meteorites.

NASA's Weather Plans

NASA has big plans for future weather satellites. They will be atomic-energy powered vehicles which will out-class the present Tiros. Researchers say weather satellites will analyze their own data before sending it to ground stations; use radar to study snow storms and tornadoes; and contain systems enabling ground stations to tune in on them to get the latest weather forecast.

Adhesives for A Dual Job

Mach 3 speeds, high re-entry temperatures and radiation pose new requirements for bonded structures. Honeycomb sandwich construction will have to withstand environments from —65° to 1000°F or more. Organic resins may provide interim service. Longer range, epoxy silicone phenolic looks like a good bet. Promising work is focused on high-temperature organic and metal polymers, inorganic polymers and ceramic types.

Ground Equipment Boom

As space and missile equipment grows larger and more complex, the handling-equipment field know how will help solve future handling. problem: Move a 6-ton Atlas from its trailer, upend it on a launch pad with an impact that would barely crack an egg. A ball-screw drive actuator does it, with a magnetic disk brake and a walking beam. The egg test was used for acceptance. Many non-space companies with specialized knowhow will help solve future handling problems.

Lubricates Vacuum Bearings

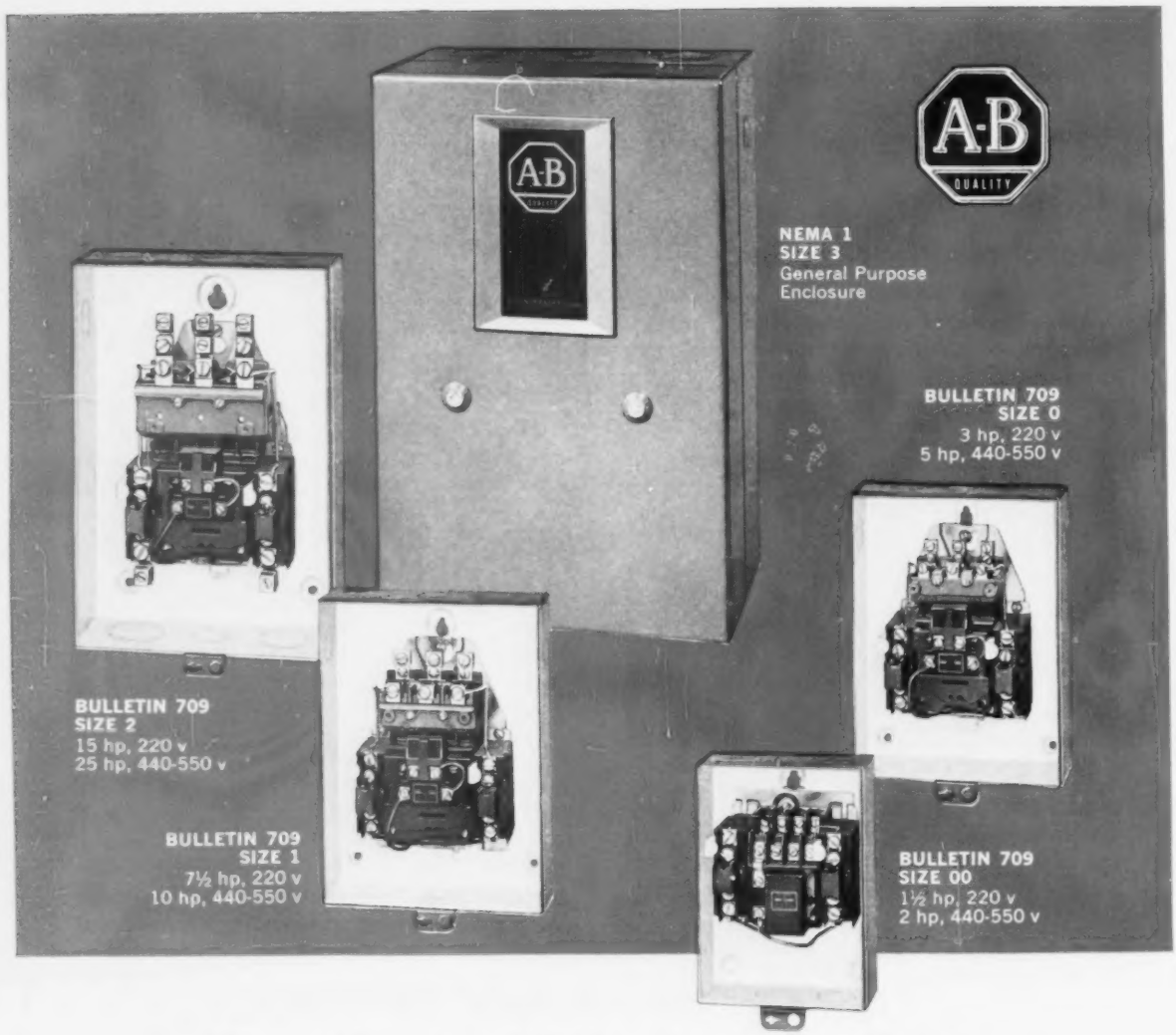
Researchers at CBS Laboratories, Div. Columbia Broadcasting System, Inc., report a new dry-film lubricant. The lubricant is a vapor-deposited multi-layer metallic coating. Bearings, coated with the new film, operate for 3000 hours at atmospheric pressures near 10^{-9} mm/Hg. Conventional coatings break down after about 280 hours. The new 0.5 micron thick coating stands up against 600,000-psi loads and is designed to withstand accelerations up to 40G.

Which Shielding Material?

The Government is giving scientists and industry information on what radiation shielding is expected in U. S. spaceships. The report states: Shielding, to protect men from the radiation dangers of space flight, might weigh as much as 200 ton. The report mentions copper, carbon, laminations of lead and lithium hydride, tungsten, boron and carbide as good shielding materials.

Water Shapes Bulkheads

Huge shapes—even king-size bubble buildings and space-vehicle bulkheads—will result from a new forming concept. It's known as "decoction forming." In essence, tooling consists of a boiler plate with a water-line fitting. A tool ring secures each preform blank to this plate. Then, water feeds under the blank at pressures from 65-250 psi. Water swells each blank to size with 0.001-in. skin-thickness variations.



According To All Previous Standards... These New Allen-Bradley Motor Starters Offer MORE RELIABILITY AND LONGER LIFE!

The new Allen-Bradley solenoid starters bring an up-to-the-minute measure of performance to industry. While the previous A-B Bulletin 709 solenoid starter set its own mark of quality over the last 30 years, and was generally recognized as "the best control on the market," the new Series K line of solenoid starters leave the older model far behind. Rating for rating, no other starter equals their reliability and long life. They are good for *more* millions of trouble free operations than you'd think possible. And, with extra interrupting capacity "built-in," they are easily equal to any "job" they may be asked to handle within their listed ratings. Brooks Stevens, internationally famous industrial designer, has given the modern new enclosures a distinctive appearance that will add "eye appeal" to every installation. Please write for full details contained in Publication 6100: Allen-Bradley Co., 1341 South First Street, Milwaukee 4, Wisconsin.

ALLEN-BRADLEY **Quality Motor Control**

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Advanced Forming Techniques Spur Beryllium Usage

Difficulty in forming beryllium is one of the major reasons in restricting its greater use.

Latest forming advances are providing new shapes and improved properties.

▪ Learning to fabricate beryllium has been a tough challenge. It's one of the major reasons holding back greater use of this unique material. However, slowly but surely, beryllium's fabrication problems are being solved.

Producers are modifying forming techniques; new shapes and sizes are available; their mechanical and physical properties are improved.

Latest Practices — Progress in beryllium fabrication technology, made in recent months, was a key portion of the Beryllium Metallurgy Conference held at New York University last week.

What are the latest practices in the fabrication of beryllium?

Consider hot pressing, for example, as reported by J. P. Denny of Beryllium Corp., Reading, Pa.

Most by Hot Pressing — Most beryllium components produced today, he explains, are prepared by hot pressing beryllium powder—followed by machining to a desired shape.

Hot pressing is done in a vacuum and utilizes graphite or steel dies. A single-action hot-pressing die is normally composed of a die body, a top and bottom plug, and a ram or plunger.

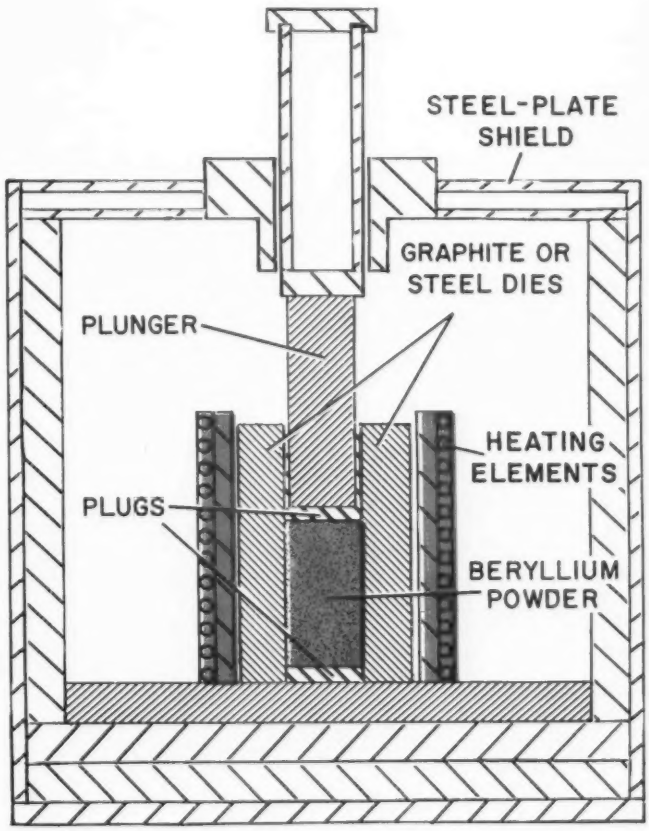
The die body is usually a cored cylinder. Typical height is 75 in. Plugs are machined to fit the die body so that a minimum of beryllium powder will be lost during evacuation of the system.

Close Packing Is Vital—Screened beryllium powder is loaded into the die from special steel containers. The top graphite plug is then inserted; vibrating of the powder follows. Vibration insures maximum packing density—about 57 pct of theoretical density.

The die then transfers to the hot-pressing furnace. Special care is taken to align the powder column with the plunger and hydraulic ram. A vacuum is then applied slowly to the system — slowly because fast pumping rates may cause powder loss.

When an adequate vacuum is ob-

Use Single-Action Hot Press



Lockheed Missiles & Space Co., Lockheed Aircraft Corp.

Note Forged Properties

SPECIMEN	Tensile Strength, Psi	Yield Strength, 0.2-pct offset psi	Elong., pct	Remarks
90° ANGLE, 14 x 3½ x ⅝ in.	67,000	55,000	2	Forged at 1600 °F
	53,400	36,100	2.25	Forged at 1900 °F
SHAFT, 12-in. long	58,900	36,400	1.93	Forged at 1600 °F
	43,900	32,800	1.86	Forged at 1900 °F
RING, 8-in. diam. x 4-in. thick	60,900	41,100	2.9	Forged at 1600 °F
	52,200	38,600	1.2	Forged at 1900 °F
HOLLOW BOWLS				
(min)	43,000	27,000	0.2	Results from 441 parts
(max)	73,000	63,000	7.4	
(mean)	53,072	38,650	2.70	

Wyman Gordon Co.

tained, a slight pressure (200 psi) is applied to the powder column. Next, the unit is heated to about 1200°F. This results in outgassing of the powder.

Heat and Vacuum—After a suitable holding time, the temperature is slowly increased to 1950°-2000°F. The rest of the required pressure (about 1000 psi) may be applied at this point or it may be applied slowly throughout the heating cycle. (Presses, usually hydraulically operated, with capacities up to 600 tons are used.)

Final pressure and temperature are maintained until plunger movement becomes negligible as determined by a dial indicator. The pressure is then released and the hot-pressed body furnace cools to 1000°F, at which point the die is removed from the furnace.

Bulk density can be produced to at least 99-pct theoretical density; minimum mechanical properties are 40,000-psi ultimate tensile strength, 30,000-psi yield strength and 1-pct elongation.

Make Large Billets—With this technique, billets up to 40-in. diam and 36-in. high can be made. Length-to-diameter ratios up to 3:1 are feasible in certain size ranges.

Parts are usually for space and nuclear applications such as heat shields for the Mercury man-in-space capsule, gyroscope parts, moderators and reflectors.

How About Extrusion?—Extrusion is the most solidly-established fabrication process for beryllium at the present time, states Mr. H. S. Rubinstein of Beryllium Corp. Currently, rod, tubing, and shapes of varying complexity, such as T's, angles, trifoils, squares and rectangles, are being made on a fairly-routine basis.

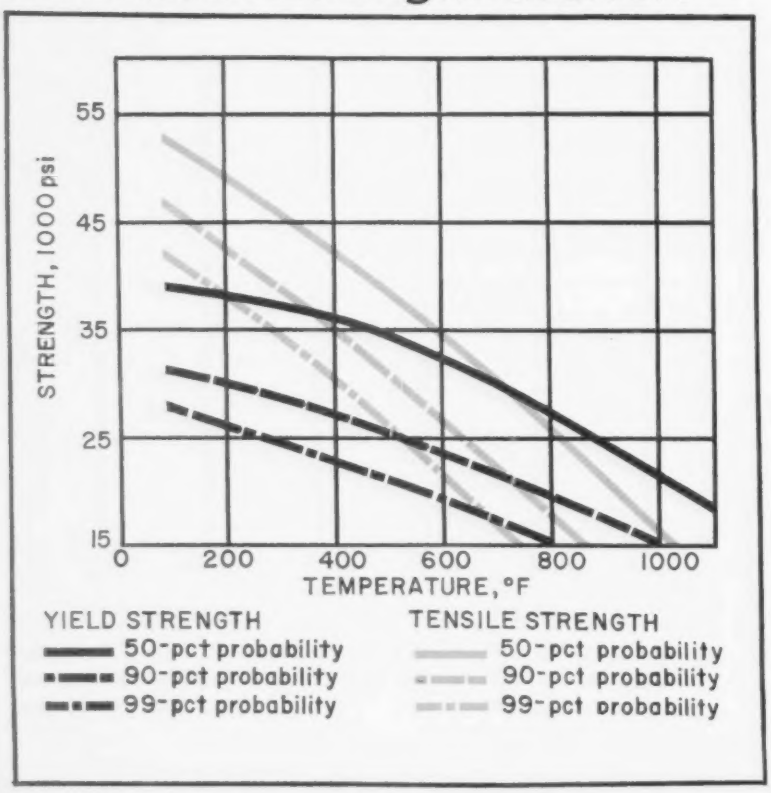
Billets are made of powder, clad in mild steel. Extrusion is at 1950° F. By controlling the billet density and the reduction ratio, scatter in mechincal properties has been greatly reduced.

Current specifications are: 70,000-psi ultimate tensile strength; 35,000-psi yield strength and 5-pct elongation.

Large tubing is extruded—by standard mandrel techniques—from a hollow billet, clad in mild steel. Tolerances are: OD — 2.575 in., +0.013 in., —0.010 in.; wall—0.440 in., +0.021 in., —0.024 in.; as extruded and decladded.

Cored Billet—Because small tubing can't take a mandrel, it's extruded with a "cored billet." A removable core (Hadfield manganese steel) is inserted in the hollow-beryllium billet assembly before heating and it's reduced proportionately

How Much Strength Scatter?



in cross section with the remainder of the billet assembly.

Typical tolerances of the small tubing are: OD— 0.400 ±0.010 in.; wall— 0.050 ±0.002 in.; ovality— 0.007 in.; bow— 0.010 in. per ft of length.

Forging of beryllium has only recently had much success, according to Mr. Rubinstein. Still, it's probably being used to fabricate more pounds of beryllium than any other process at this time, he says, except for machining of hot-pressed billets.

Forging Routes — Two major routes are presently being followed: Pressing of encapsulated powders; forging of hot-pressed metal. The former is used for making those fairly-simple shapes which have no special property needs. The latter technique yields more complex shapes.

Rolling and drawing, two of the more recently-developed techniques, were covered by R. G. O'Rourke from Brush Beryllium Co., Cleveland. Making sheet calls for rolling vacuum-hot-pressed block which is canned in steel, he explains. Rolling temperature is about 1400°-1500°F. Generally speaking, about 50-60 pct reduction can be made before the steel jacket has to be replaced.

Special precautions taken during canning permit the jacket to be easily removed after the edges are cut away. Finishing steps include vapor blasting, grinding, pickling and straightening.

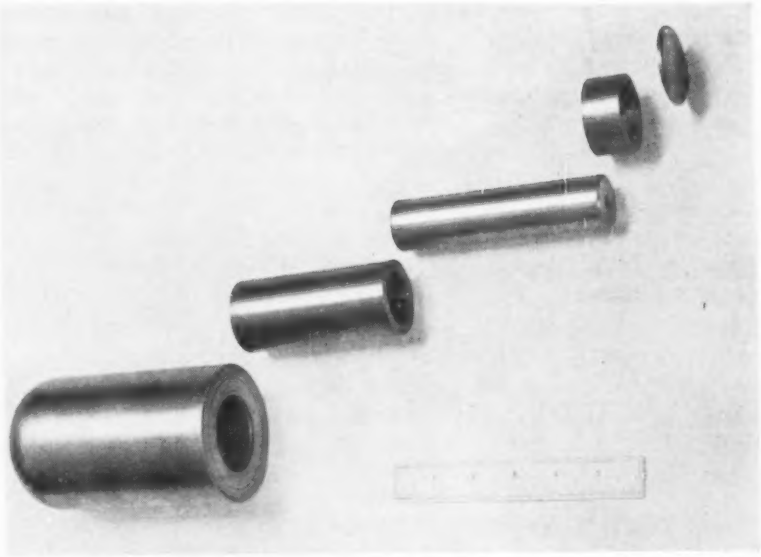
What Are Properties?—A tentative specification guarantees minimum tensile properties of 45,000-psi yield, 65,000-psi ultimate tensile strength and 5-pct elongation in a 2-in. gage length. Out of flatness will not exceed 3 pct for sheet 0.025-in. thick and over. For thicknesses under 0.025 in., out of flatness will not exceed 2 pct.

A number of shapes have been made from sheet by rolling, spinning and shear forming. Included are: Aircraft angles and Z's and spun salad-bowl shapes ranging from 0.040-0.357 in. thick.

Billet Strengths Are Good

BILLET CONDITION	Aver. Density, g/cc	Aver. Tensile Strength, lb/sq in.	Aver. Yield Strength, lb/sq in.	Aver. Elong., pct	Aver. Contraction, pct	Aver. Product Yield, pct
Cold-Pressed 70 °F (not sintered)	1.22–1.31	90,700	43,900	13.4	13.4	43
Warm-Pressed 850 °F (not sintered)	1.58–1.71	87,400	42,200	12.6	13.1	68
Pressureless-Sintered (loose powder)	1.70–1.80	84,600	41,100	10.8	11.1	88
Hot-Pressed	1.84–1.86	83,700	40,900	10.3	10.4	89

The Brush Beryllium Co.



EXTRUDED TUBING: Exploded view shows stages of typical beryllium-billet assembly for extrusion of small tubing by employing cored billets.

Standard sheet sizes are 20 x 60 x 0.20 in. Experimental sheet of the same length and width; but down to a gage of 0.010 in. has also been made.

Longer and Wider—A program for making longer and wider sheet is nearing completion. Brush expects to have available by the spring of 1962, 36 x 96 in. sheet with a thickness of 0.040 in. and to the same specifications as the standard sheet.

The process for drawing tubing as described by Mr. O'Rourke, can also be applied to wire drawing. Already, wire of 0.004-in. diam has been drawn. But this is not the limiting size, he adds.

Tensile strengths of over 185,000 psi are consistently obtained. However, development work is continuing and wire with an ultimate strength of 300,000 psi is expected.

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Ask for Reprint **No. 239**

Automatic Lines Deposit Gold On Printed-Circuit Cards

Gold is an excellent electrical contactor. When it's used, oxidation problems disappear.

Automatically plated on contact tabs, 0.00015 in. of gold improves printed circuits.

▪ Two automatic electroplating lines form one of the largest gold-plating installations in the world. These lines serve in the manufacture of electronic printed-circuit cards for modular systems.

In the plating process, leads for the circuit cards gain nickel and gold coatings. This insures outstanding wear- and corrosion-resistant properties along with low electrical resistance.

Both plating lines were designed by F. B. Stevens, Inc., Detroit, with help from engineers at the International Business Machines Corp. They're installed at IBM's General Products Div., Endicott, N. Y.

Little Scrap—Capable of plating more than 100,000 circuit cards per day, the oval-shaped lines incorporate tanks that keep about 500 oz of gold in solution. Plating results are quite successful. With 100-pct inspection, less than 3 pct of the card-like panels are scrapped.

Gold is expensive. Thus, one of the most critical control factors centers on the amount of gold deposited. Too little gold yields poor wearing qualities. Too much creates needless waste.

On every circuit card, gold plating is confined to one small but critical area—the tabs which fit into mounting blocks. These tabs provide electrical contacts between computer circuits and the printed circuitry on each card.

Why Use Gold? — Despite its costs, gold is the best plating medium for these tabs. It's an excellent electrical contactor. And it doesn't oxidize.

Optimum use of these traits is made by a gold-on-gold contact. In use, the gold-plated tabs contact a small mass of gold that's deposited on the mounting blocks' contact pins.

One of the gold-plating lines is a slight refinement over an earlier model. Both lines perform three basic functions. These include: Cleaning of the cards before and after plating; depositing a base layer of nickel; and plating a thin gold film over each nickel surface.

Every function of the automated plating process is closely monitored. A bank of warning lights, various gages and recorded data show the operator at a glance whether the process is okay.

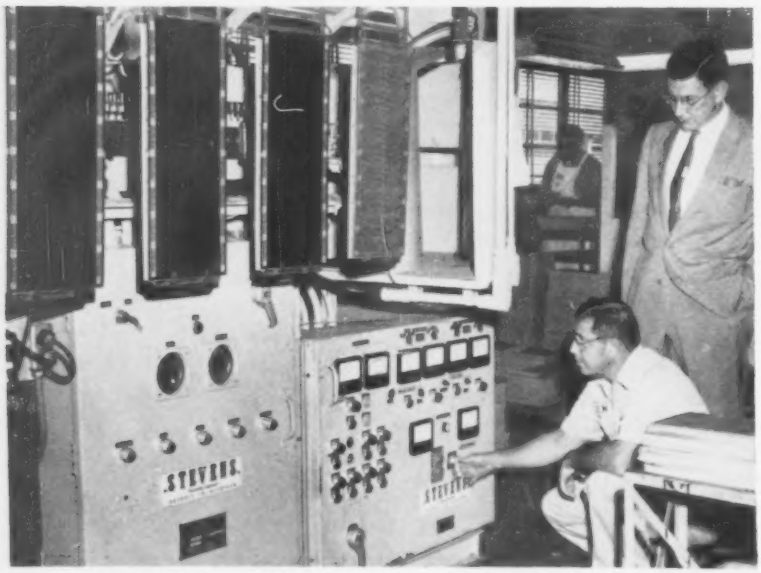
Vital Checks — As a further check on plating quality, the chemical lab makes periodic checks on the plating bath's chemical analysis.

Each plating line is completely automatic. It carries banks of 16 cards through a series of cleaning, rinsing and plating baths. On the new line, cards are transported and lowered into the baths on a series of 88 arms. The other line has 78 arms. Every arm holds two banks of panels as it moves in an oval loop along a long chain.

The printed-circuit cards already have etched copper circuits as they enter the plating lines. An asphaltic compound covers all the copper except for the part which forms leads or tab areas.

During plating, about 0.0005 in. of nickel coats the copper in the tab areas. Then, 0.00015 in. of gold is plated on these nickel surfaces.

Cleaning, plating and activating tanks are located on the periphery of the oval lines. All panel-carry-



PLATING LINE: Printed-circuit cards move through an automatic plating line where they receive thin deposits of nickel and gold on contacts.

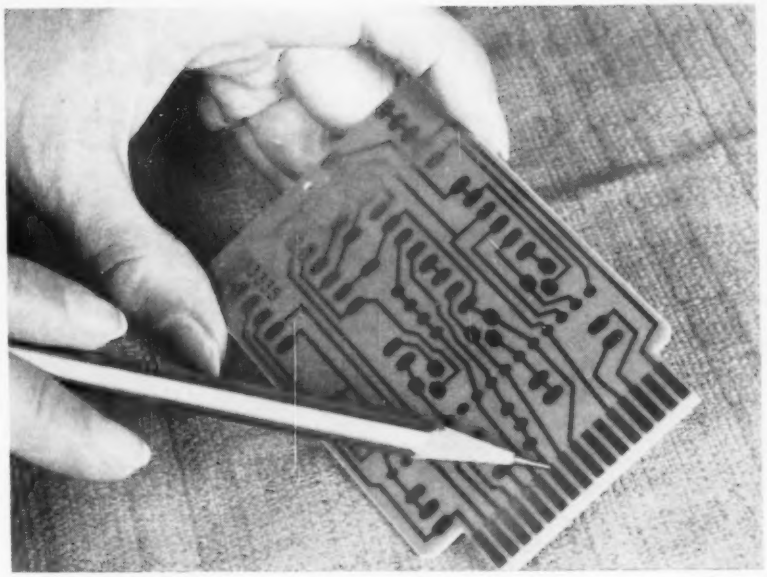
ing arms are anchored above and behind these tanks.

Up and Down—Chain-link belts, driven by electric motors, move the arms around the oval lines. Cams raise and lower the arms, moving their circuit-card cargoes in and out of the various tanks.

One operator loads and unloads the banks of cards at a single station on each line. After he loads the panels on the arms, they're carried to the first tank. Here, an alkali solution cleans each panel.

The next tank contains clear water for rinsing. Then the cards move along to a pickling tank that contains a hydrochloric solution.

Another water rinse is a must after pickling. This second rinse is followed by a sulfuric pickle before the cards enter the nickel plating bath.



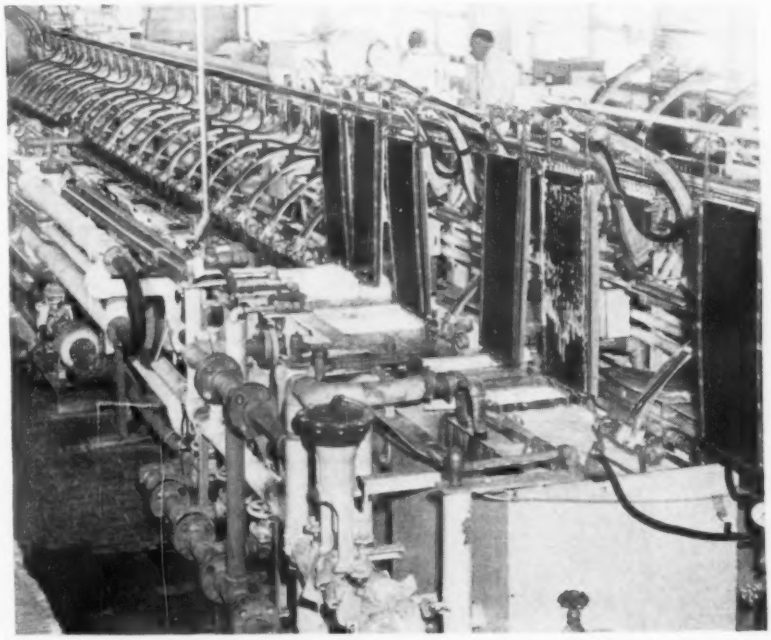
GOOD CONDUCTOR: Gold on the electrical-contact tabs insures efficient circuits. This printed-circuit card will serve in a modular system.

Nickel Dip—The nickel-plating bath contains 900 gal of solution with nickel anodes. Electrical contact is made with the cards' leads by positive connections through the panel-carrying arms to a bus bar.

Constant filtering keeps contaminants out of the nickel-plating solution. A heat exchanger, near the tank, maintains the solution's temperature at 120°F. The solution is constantly pumped through this exchanger as well as through the filter.

After they leave the nickel-plating tank, the circuit cards are spray-rinsed. Then, they're dipped in a tank of sulfuric-acid solution. This dip activates the nickel.

Next, the cards receive a deionizing rinse in demineralized water. After another spray rinse, they're dipped in a citric-acid activator. Finally, after still another clear water rinse, the circuit panels enter the gold-plating bath.



DOWN THE LINE: Banks of cards move through one of the plating lines. They're dipped in various tanks. All areas but the tabs are masked.

Gold Solution—The gold-plating tank contains 500 gal of acid solution. This solution is constantly agitated and filtered. Impeller pumps on either side of the tank suck in the solution, then discharge it under each station. Titanium-platinum anodes are located at the plating stations.

Again, the temperature of the bath is rigidly maintained—in this case at 100°F. The lab analyzes the bath three times a week for gold content. Every 90-100 amp hours, an operator adds gold salts to maintain a one-ounce-per-gallon ratio.

Electroplating of the gold takes place as the panel-carrying arms contact a copper bus bar that runs the entire length of the bath.

Saves the Gold — Next to the gold bath, are three water-dragout baths. These baths rinse off any excess gold that clings to the panels. Running water is the last rinse.

Leaving the water tanks, the circuit-card panels enter two trichloroethylene degreasing tanks. Then, they're sprayed with degreasing solvent prior to drying.

Can Aluminum Plate Compete For Cryogenics Jobs?

The search continues for structural materials that will stand up to ultracold liquid gases.

Plate from the 5000-series of aluminum alloys is a likely candidate.

■ Data on the strength properties of the 5000-series aluminum-magnesium alloys were recently reported at a session of the Cryogenics Engineering Conference. They confirm that these alloys have distinct advantages for use at the ultralow temperatures of liquid oxygen and hydrogen.

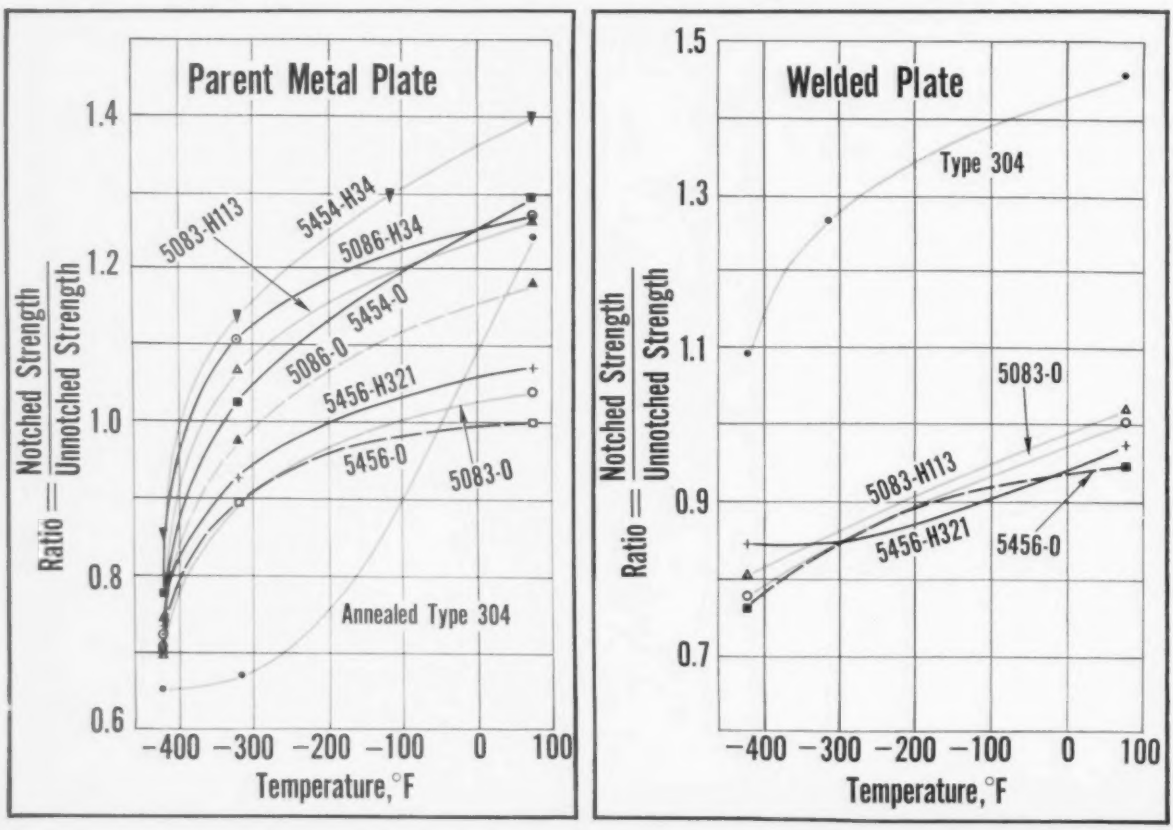
A report on experiments at Battelle Memorial Institute, Columbus, O., sponsored by the Aluminum Assn., noted, "In general, the data show that the tensile strengths of all the aluminum alloys in the welded and unwelded conditions increase as the temperature is lowered from room temperature to —423°F. They do not, for example, reveal a transition from ductile to brittle behavior as the test temperature is lowered."

New Report — The report presents comprehensive data on the 5000-series aluminum plate at the temperature of liquid hydrogen. One of the alloys, 5083, has been used for two 35-ft hydrogen tanks recently completed by Douglas Aircraft Co. at its Sacramento, Calif., facility.

Also studied was one stainless alloy, Type 304 plate. Separate tests were made on welded and unwelded, notched and unnotched samples. One conclusion was: "In general, the yield strength-to-density ratios of the 5000-series aluminum alloys, both welded and unwelded, were higher than those of the Type 304 stainless steel at room and cryogenic temperatures."

The studies were directed, and the paper prepared, by L. P. Rice, J. E. Campbell, and W. F. Simons

What Happens to Notch-Strength Values?



of the Institute staff.

Liquid-Gas Use Grows—Behind this interest in cryogenic properties is the rapidly increasing use of liquid gases such as oxygen for steelmaking and hydrogen for rocketry.

Despite this popularity, however, liquid gases are presenting a problem to their users. The problem? How to contain and store these liquid gases? Structures which contain them must often withstand high stresses at ultralow temperatures.

FCC Structure Is Key—Aluminum, because it has a face-centered-cubic structure, is a likely candidate for such jobs. Cryogenic properties of some of the aluminum alloys have been measured but little has been done about the 5000-series. And almost no work has been done on determining the properties of plate materials. This, then, was the purpose of the study.

Tensile properties of four aluminum alloys, each in two temper conditions were studied at temperatures of 75°, —320° and —423°F. Specimens from welded plate of each temper of two of the aluminum alloys were included in the program. Full thickness test welds were made by the supplier across the plate at right angles to the rolling direction.

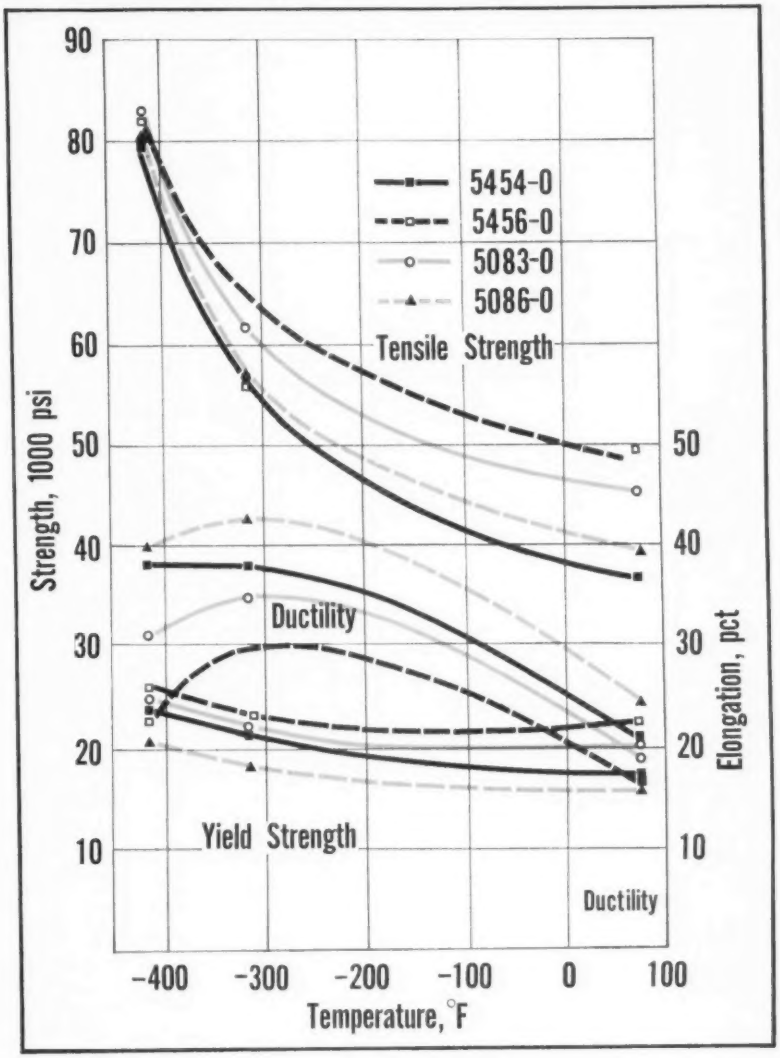
Magnesium Gives Strength — These alloys represent a series in which the main strengthening element is magnesium. In the order given in the table, the strength would be expected to increase with increasing magnesium content. Strength can also be altered by means of cold work.

Tempers are designated as follows:

0—full annealed
H34—half hard stabilized
H113—⅛ hard special practices
H321—¼ hard special practices

Specimens were cut in the longitudinal direction from ¾-in. plate. Both notched and unnotched specimens were used. Type 304 stainless was chosen for comparative purposes because it's often used for cryogenic equipment. The stainless specimens were cut from a commercial mill-annealed plate.

Ultracold Alters Properties



Tensile tests were made on a hydraulic testing machine calibrated to an accuracy of better than 1 pct. Accuracy of the extensometer and related equipment were found to be equal to that of the testing machine. Tensile properties at —320°F were determined with the specimens completely submerged in liquid nitrogen. Tests at —423°F used liquid hydrogen as the coolant.

Strengths Increase — In general, the data show that the yield and tensile strengths of the aluminum alloys in the welded and unwelded conditions increase as the temperature is lowered from room temperature to —423°F. However, the tensile strength of the welded aluminum alloys did not increase as much as did the parent-metal strength with decreasing test temperatures.

Ductility was generally good for the aluminum alloys. For most alloys, elongation and reduction of area were 9 pct or more—even at —423°F.

In most cases, the elongation and reduction of area followed the same general trend as the temperature was lowered from room to —423°F. This consisted of an increase in both values as the temperature was de-

Check Cryogenic Candidates

Chemical Composition, weight pct

Material	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other[a]
ALUMINUM ALLOYS									
5454	0.09	0.22	0.05	0.76	2.66	0.10	0.03	0.02	—
5086	0.13	0.25	0.04	0.36	3.93	0.13	0.07	0.01	—
5083	0.11	0.21	0.03	0.72	4.60	0.11	0.04	0.02	0.009
5456	0.11	0.23	0.07	0.78	5.16	0.11	0.04	0.03	—
ALUMINUM-ALLOY WELD ROD									
5556 (nominal)	—	—	—	0.80	5.25	0.10	—	0.10	
5183 (nominal)	—	—	—	0.75	4.75	0.15	—	0.10	

STAINLESS STEEL	C	Mn	Cr	Ni	
Type 304 (plate)	0.08[b]	2.00 max.	18/20	8/12	(composition limits, Type 304)
Type 308LC (wire)	0.04 max.	2.5 max.	18/20.5	9/10.5	(composition limits, weld wire)

(a) Total of remaining elements other than aluminum. (b) Actual carbon content of plate.

creased from room temperature to —320°F followed by a decrease from —320° to —423°F; the value at —423°F is at least as high as that at room temperature.

Erratic Behavior—For all specimens, the sharp-notched strength increased as the temperature was lowered from room temperature to —320°F. However, from —320° to —423°F, the notched strength showed erratic behavior. It decreased slightly in some cases and continued to increase in others.

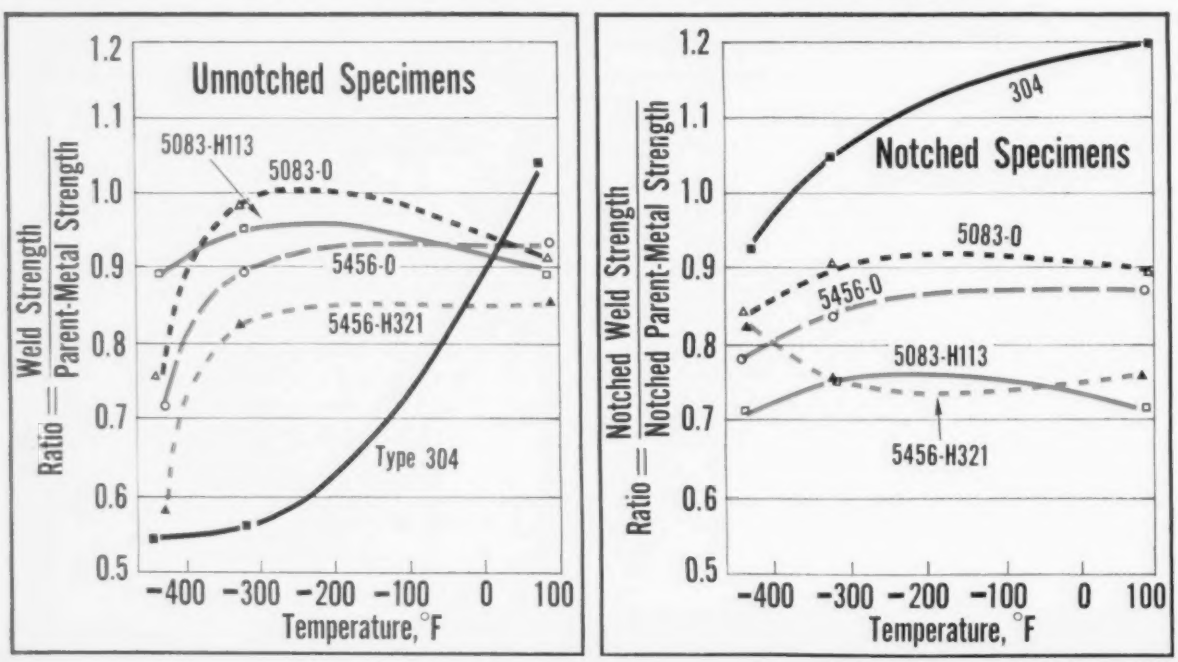
Of considerable importance to design engineers, however, is the fact that, in all cases, the sharp-notched strength in the 5000-series alloys was considerably higher at —423°F than at room temperature. Furthermore, the sharp-notched strength was greater than the yield strength at all temperatures. Based on this behavior, the notch toughness is rated as very good.

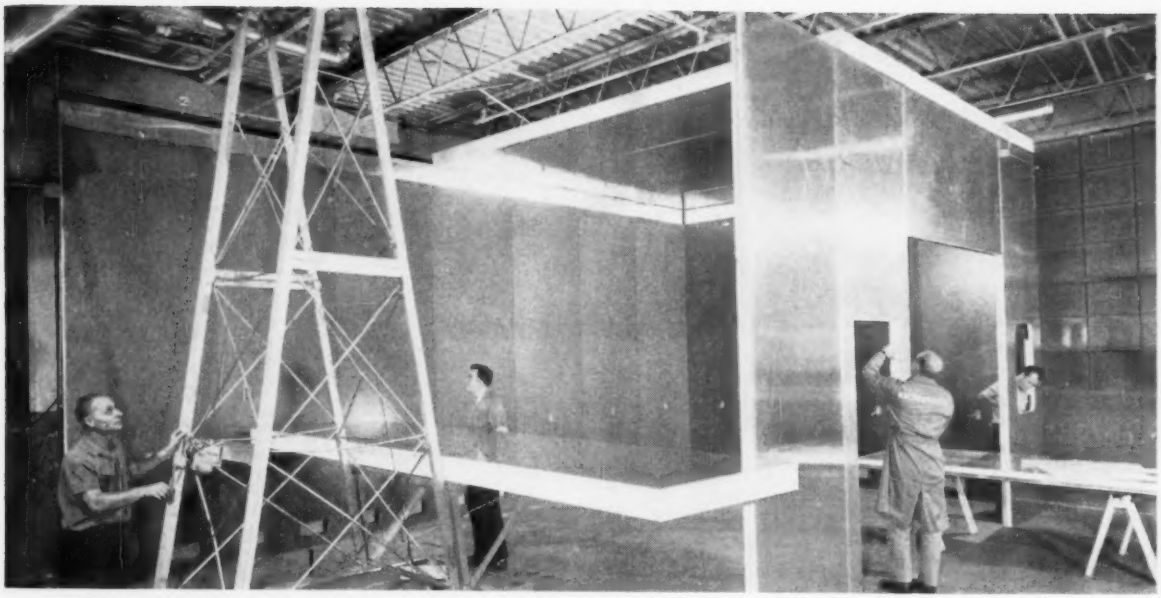
The charts on p. 116 compare various alloys on the basis of notched to unnotched tensile strengths. The first set of curves shows that, in parent-metal plate, the 5454-H34 aluminum alloy has greater notched toughness at each temperature than the other 5000-series alloys. For that matter, it also tops Type 304 stainless steel.

How About Welded Plate? — However, the second half of the chart, which points up the effect of welding, shows that welded Type 304 stainless steel has a higher notched-to-unnotched tensile ratio than any of the 5000-series aluminum light alloys at all test temperatures.

The final chart demonstrates weld versus parent-metal strength. It shows that 5083-H113 has at least 90 pct of the parent-metal strength from room temperature down to —423°F.

Ultracold Puts Freeze on Weld Strengths





FITS INTO PLACE: Modular construction is the key to the aluminum gage lab's quick assembly process.

Prefab Lab Aids Gage Control

Close-tolerance machining often dictates the need for a temperature-controlled gage laboratory.

One company offers prefabricated aluminum structures with a host of benefits.

▪ Precise inspection and critical assembly jobs usually call for a special room built within the plant. Dust and temperature controlled, the rooms spring up wherever gages and finished parts must be measured with extreme accuracy.

Often as not, production ceases on one line and the need for a gage laboratory exists at the other end of the plant—hence the need for a movable lab. The Sheffield Corp., Dayton, developed several lab types and sizes which feature modular or prefabricated construction.

Quick Control—The Modulab, as it is called, goes up quickly and can be disassembled just as fast. The room can be enlarged later, if needed, at minimum cost and delay.

The laboratory is constructed of 4-ft wide aluminum-clad panels. They are insulated with polystyrene. Three standard labs are designed 16-ft wide and 12-ft high. The lengths vary from 24; 32 to 40 ft.

The standard sizes are only reference points, since with the modular-panel principle rooms can be set up to any desired size. For example, The Bendix Corp., Sidney, N. Y., found need for special lab design.

Four Rooms in One—The prefabricated structure is 42 ft x 48 ft and requires four inner rooms to create the proper environmental conditions for the work and the worker. The structure includes a whiteroom, cleaning room, locker room and an air shower.

The white room takes up most of the area. It serves as the inspection and assembly area.

The cleaning room houses ultrasonic units which clean parts upon arrival. After cleaning, parts are passed through an air lock which connects the rooms. A locker room contains facilities for assigned persons to clean up and change into special nylon suits. Only 25 people are allowed to work in the enclosure at any one time.

The air shower is the smallest room. It's situated so that every person entering the enclosure receives a controlled blast of high-velocity air. This removes dust and dirt as the worker moves about from locker room to white room.

Holds the Line — Temperatures within the white and cleaning rooms are held at 70° ± 1°F. However, they can be set to hold ± ¼° F. Relative humidity is governed at 40 pct ± 5 pct.

The incoming air is filtered so that it's 99.97 pct free of dust particles above 0.3 microns. There is a complete change of air every 3 minutes. Conditioned air enters the room from louvers in the ceiling and is drawn off close to the floor.

All servicing, whether it be lighting, humidity or temperature control, is done outside the room.

Special Equipment Pays Off

It's a Wise Solution to Critical Production Runs

By **J. H. Berryman**—Mgr., Special Products, Air Reduction Sales Co., Union, N. J.

Success on the production line of custom-built equipment depends upon mutual cooperation between user and builder.

Then, and only then, can the user meet his objectives.

■ Industry is witnessing a growing trend toward "systematized" automation in equipment design. Two forces are behind this trend. One is that management wants faster rates of production from existing lines. The other force concerns the product itself. It must be reproduced time and time again at a consistent level of high quality.

When welding is involved in either of these forces, the builder of welding equipment can solve the problem through several approaches. It's possible that the required welding apparatus is already in existence. In that case, the supplier simply adapts it to the customer's fixturing. However, the builder's responsibility should not end there.

Many factors must be considered before tailoring the tooling, fixturing and processing equipment to the job at hand. Have suitable indexing and positioning devices been designed? What is the material? What problems are likely to crop up in handling and production flow?

Start From Scratch — Sometimes there's no prototype on which to base design. The only solution is to "work from the ground up." Here, experienced engineering will pay off. No matter what your problem is, let the builder in on your objectives right at the beginning. If you do, you'll end up with more functional equipment.

Too often, companies design special units without consulting the welding manufacturer. This do-it-yourself approach can get the company in trouble, too. There are many sophisticated welding systems on the market. Is the manufacturer's engineer aware of their potentials? How much does he know about the weldability of the metals in question?

A successful system requires that the package be tied in with the material. Here's another pitfall. Companies often obtain components for their system from several suppliers. In the event of equipment failure, there is no single source of responsibility.

A few years ago the Air Reduction Sales Co. established its Special Products Dept. in Union, N. J. For the first time industry was offered complete engineering services, manufacturing as well as consulting, in one package. Our original complement of three men has now grown into a working force of 45 engineers and designers.

TOP-LEVEL CONFERENCE: The author (right) discusses future programs with R. A. Stone, sales manager of the Special Products Department.

Custom - Built Machines — The main emphasis naturally is on welding. Our department has already designed and installed special automatic equipment to weld pipelines, tailpipes and missile skins. Beer barrels that can be housed inside home refrigerators are among other projects for continuous welding.

Our scope isn't restricted to welding alone, since ideas developed for one industry can be applied to other industries. We've built equipment to monitor the purity of gases in the manufacture of transistors. Small regulators were also designed

to supply biological specimens with oxygen during experimental space flights.

The steelmaking industry is becoming a big customer, too. Special Products designs oxygen lances for insertion in openhearth furnaces. In addition, we have just completed an automatic scarfing machine which is now in operation in one of the rolling mills at Bethlehem Steel Co., Vernon, Calif.

We worked closely with Bethlehem on this unit. This was essential, since a scarfing machine of this size must be tailored to the needs of the specific rolling mill. The machine is keeping up with established rolling speeds. It gives a clean, flat surface to a variety of unfinished steel billet sizes without delays in steel production.

Higher Production—One of our specialties has always been to increase welding speed. One customer came to us hoping to find higher output in the welding of exhaust pipe sections. At the time, this company was turning out 300 assemblies per day using Mig welding methods.

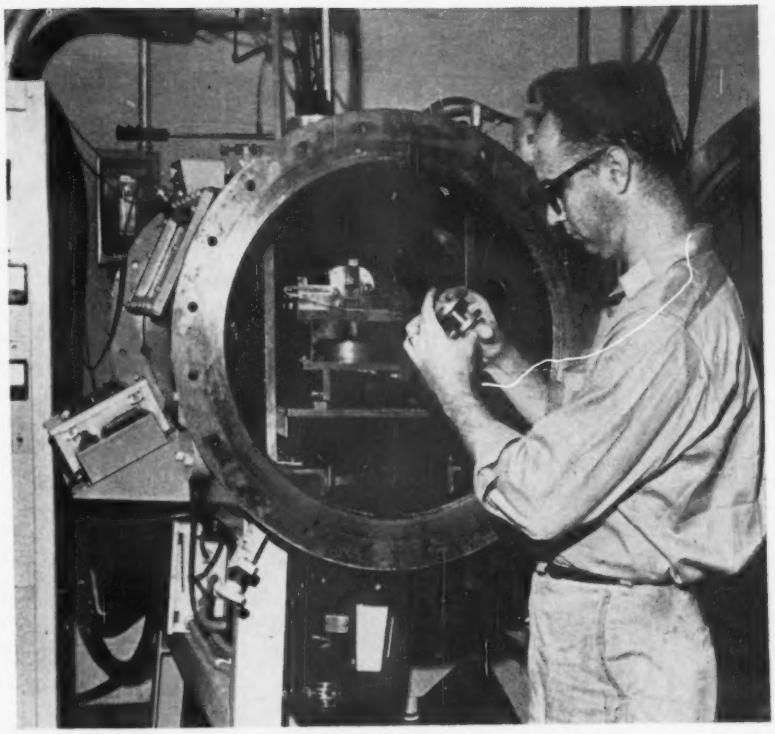
The new equipment package, fully automatic, welds the same assemblies at the rate of better than 1000 parts per day. Although the new equipment did reflect a high capital investment, it paid for itself in less than 300 working days.

This particular operation consisted of welding a base tube to a "Y" assembly. Parts are 16-gage carbon steel, 2½ in. OD x 36 in. long. An operator simply loads the parts in a fixture, presses a starting button, then unloads the welded assembly.

All other steps are controlled automatically. Actual welding time is only 8 seconds per assembly. That means that the welding speed is about 60 ipm.

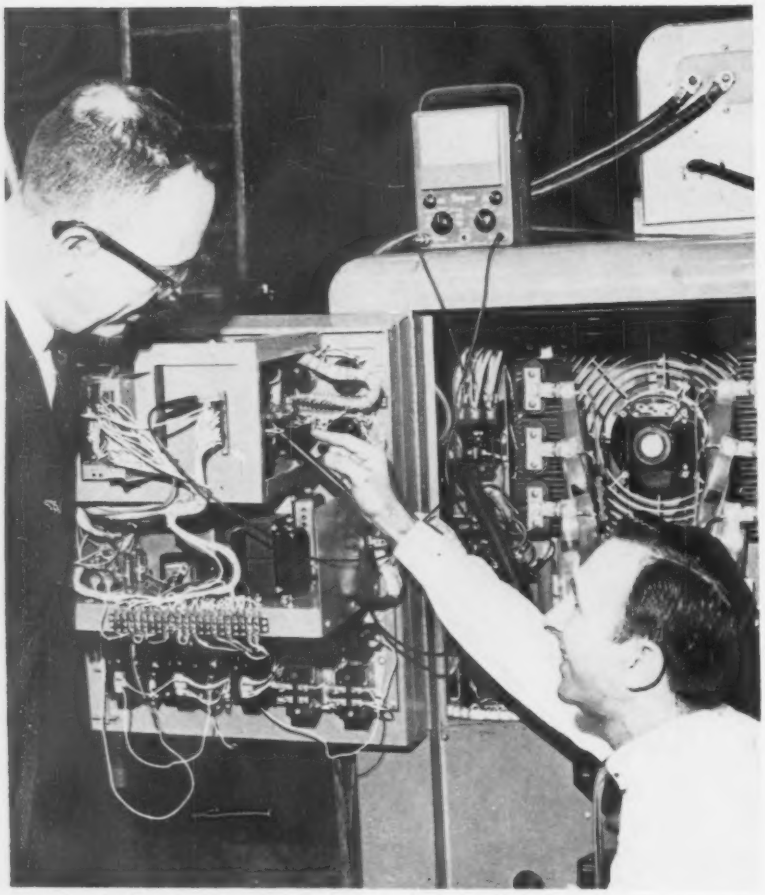
Electronics — Miniaturization is another specialty. An example is the automatic welding of 0.025-in. thick caps to 0.120-in. thick bases of oxygen-free, high - conductivity copper for use in transistors.

Welding speeds here are 135 ipm. The time it takes to complete each

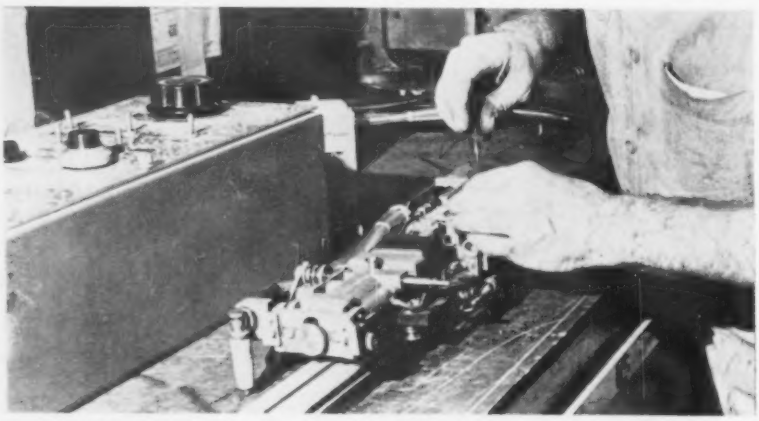


TEST MODEL: A model of Airco's electron-beam welder, set up in the lab, is used to make refinements and special adaptions. Forty-five engineers and designers insure complete factory and field service.

CONSTANT CHECKS: One of the engineering-staff members checks data on a new power source that's being developed for the aircraft industry.



MINOR CHANGE NEEDED: Mr. Stone talks over a design change with one of the engineers. They're making revisions on a welding power source.



TINY TORCH: Workman makes final adjustments on a small tungsten-arc inert-gas welding-torch. It's slated to serve in aircraft production.

weld is 1.3 seconds. Equipment for this job includes a small Tig welding torch, power source and the controls required to fixture and index the tiny parts.

Diversified Interests — The department is engaged in many areas. Most important are gas combustion, gas control, electron beam welding, arc welding and electrical services.

We also work closely with Airco's research arm in Murray Hill, N. J. This group designed the company's first electron beam welder. Now, this machine is manufactured and marketed by Special Products.

Of course, electron beam equipment should never be considered a shelf item. Before selling any of these units, our engineers work hand in hand with the customer. The welding chamber, for instance, must be designed to contain the sizes and shapes that the customer plans to join.

Tight Specs — The specifications issued by the space agencies serve as a real challenge to the welding industry. As evidence, the tanks for the Titan missile were 120 in. diam. Booster rockets for the future call for tanks of 350-530 in. diam.

There's only one way to achieve acceptable results in welding such large structures. For success, specially-designed process equipment must be integrated properly to the fixtures and welding tools.

Sometimes, a special product becomes a standard product. This was the case with a small wire feeder which was designed for wires in the 0.010-0.062 in. diam range. The device is mounted right on a Tig welding torch. It was originally developed to weld aluminum in one of the many missiles. It's now standard auxiliary equipment in the Airco line.

Final Words—Here is some advice to executives who are potential users of custom-built equipment. If you're a user of automatic welding equipment, you'll do yourself a great service by giving your suppliers all the information you can.

There are many products and lots of experience at our disposal; but we can only satisfy your needs if we know your final goals.

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Air Expands Sheet Into Sphere

Three-Ply Aluminum Panel Becomes Structural Cylinder

Structural spheres serve as fuel tanks for space vehicles. They're also ideal for liquid and gas-storage containers.

Now, these hollow spheres can be blown into shape by using specially-rolled sheets.

■ Team efforts have given birth to a new method for shaping hollow-metal structures. This fabrication technique is totally different from the standard method of joining two halves of a sphere.

Now, it's possible to shape hollow-metal cylinders in one piece—on an economical basis. Fabrication costs tumble as drawing, trimming, flanging and welding operations disappear.

Use Single Sheet—Each cylindrical shape is formed from a single, specially-rolled sheet of aluminum. This three-ply sheet has a core that melts at a lower temperature than the outer surfaces.

Here's how the hollow spheres are blown into shape. First, one of the special three-ply sheets is placed between hot dies in a hydraulic press. After the core melts, a hollow needle is inserted between the remaining laminates.

Air, injected through this needle, shapes the outer laminates into cylinders inside the forming dies. Inert gas can serve as the forming agent in lieu of clean, dry air.

Metallurgical Bonds — The heat and the pressure used in the expanding stage create metallurgical bonds between cylinder halves. The center core becomes completely alloyed with the two outer sheets. After this alloying process is completed, the sphere withstands ultra-high heats and pressures.

When the forming process is completed, a flange remains around the outer surface of each sphere. You can trim or shape this flange to suit your needs. Or if desired, the flange can be completely removed.

Two companies are behind this development. The Metal Specialty Co., Cincinnati, a cold-drawing specialist, boasts complete designing, engineering and manufacturing facilities. Stolle Corp., Sidney, O., helped out in blueprint and manufacturing stages.

QUICK SHAPING: A blast of air forms the specially-rolled sheets into hollow-metal cylinders. Heat and pressure create metallurgical bonds.

Suit Your Needs — The hollow-metal spheres can be tailored to suit various pressure requirements by varying the sheet's gage. As pressure demands increase, heavier sheet earns its keep.

Here's a case in point. An 0.12-in. sheet withstands 200-psi internal pressures after it's expanded into a round tank.

Tanks, containers and floats made by using the new forming method will serve in multifarious jobs.

Thermocouples Take High Heat

The use of new materials and fabrication methods have slenderized thermocouples.

If you've got to check 3000°-5000°F heats, there's a couple designed to handle it.

■ Rockets, nuclear reactors and refractory-metal processing require a device to measure, monitor and control the ultrahigh temperatures used. The best tool for the job is still a thermocouple.

A long list of thermocouple-making advances have led to their successful use at 4000°F for extended periods. In some cases, couples can be used to measure 5000°F. But more work is still needed in this area.

Smaller Sizes—Past research produced thermocouple wire with its own abrasion, corrosion and temperature resistance, without need for bulky protective tubes. This wire consists of conductor elements, threaded through ceramic insulating beads. Then, they're assembled into a protective support sheath.

Recently, the National Beryllia Corp., Haskell, N. J., developed crushable beryllium - oxide beads. Now, the high temperature resistance of beryllium oxide can be used in swaged, rolled or drawn-wire construction.

How do the crushed beads work? First, they're threaded onto the conductor elements. The beaded wires are then slipped into a protective metal sheath and drawn through dies to crush the beads.

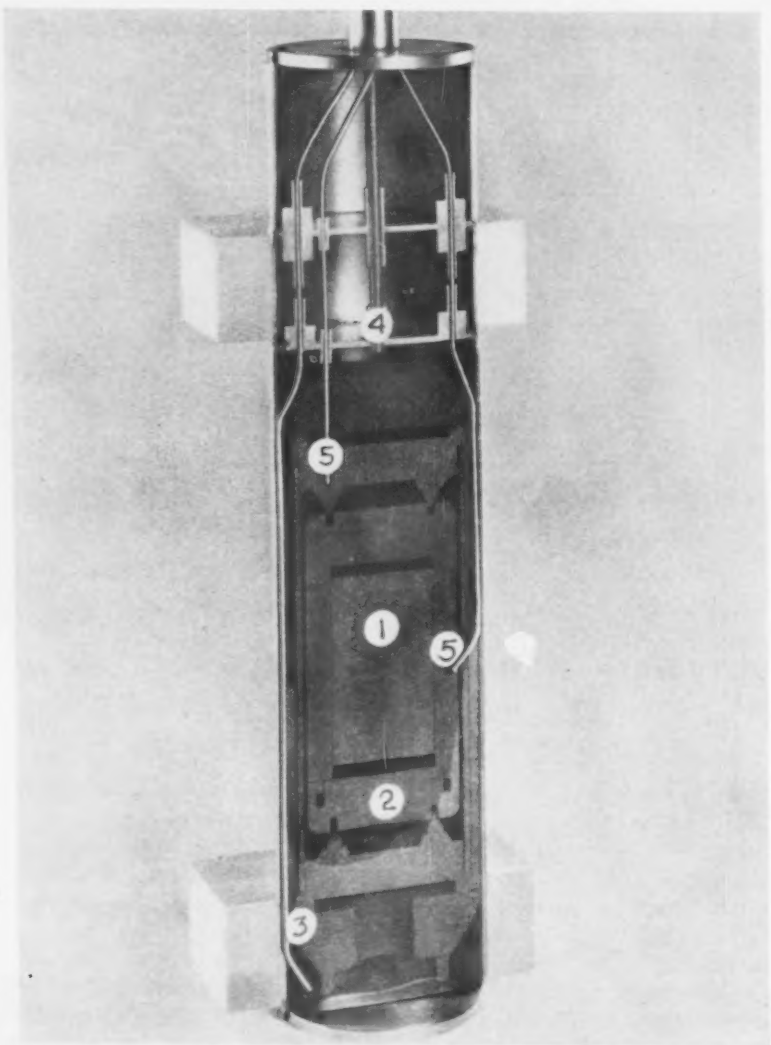
Good Distribution—The densely-packed powder insulates the conductor elements from each other and from the sheath. In addition, it provides resiliency which insures excellent resistance to impact, vibration and pressure. And, to the extent that the metals involved permit, the wire is flexible.

The diameter of this powder-clad wire can be less than the equivalent standard wire, it's reported. This permits its use in confined spaces. Weight is reduced, and response time and accuracy are improved.

Along with the new powdered insulation, there are new developments in elements and sheath materials. These include: Tungsten-rhenium; tungsten - tungsten/rhodium; and irridium-irridium/rhodium for elements; and molybdenum or tantalum for sheaths.

Right Combination—Platinum is still a valuable sheath material. With proper element wires it can be used continuously in an oxidizing atmosphere. But its maximum recommended temperature is 3050°F.

Beryllium - oxide insulated elements of tungsten-rhenium or tungsten-tungsten/rhenium with tantalum sheaths can be used to 4000°F.



HEAT CHECK: Thermocouple wire, made by Continental Sensing, Inc., Melrose Park, Ill., checks a reactor capsule at two points (5). Other capsule parts are: (1) fuel body; (2) fuel can; (3) gas inlet; (4) gas outlet.

CUSTOMER-ELECTED TO WHO'S WHO IN STEEL

The Acme-Newport name is written big and often where it counts most—in the order books of steel buyers. Before the turn of the century this basic steel producer had become top choice for unusual service and strict adherence to specification. Skilled personnel, modern facilities, alert management and persistent checks by metallurgists, have combined to make Acme-Newport specialists in the products listed below. Flexibility of operation permits fast delivery of spot orders, too . . . if you just mark them *Red Circle Service.*

PRODUCTS OF ACME-NEWPORT STEEL

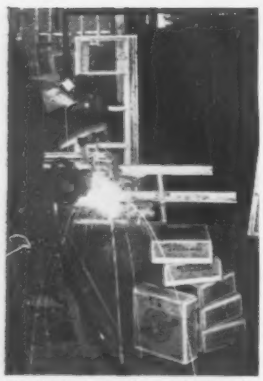
Hot Rolled Steel in Coil	Cold Rolled Steel in Coil (*full hard only*)	Plates (3/16" *and lighter*)
Hot Rolled Pickled Steel in Coil	Cold Rolled Sheets	Electrical Sheets
Hot Rolled Sheets	Alloy Sheets and Plates	Electric Weld Line Pipe
Hot Rolled Pickled Sheets		Spiral Welded Pipe

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY

SPOOLED WIRE

USE SPOOLARC®

for porosity-free welds... constant arc... better control ...fewer errors... faster work



Rapid fabrication of aluminum window frames by metal inert-gas welding requires trouble free aluminum wire. Philadelphia manufacturer increased his production with mirror-finish All-State SPOOLARC®

Wire internally inspected by RADAC

Aluminum wire in all tempers now available in mirror finish, oil-free, precision layer wound spools. ALL-STATE's cleaning and tension controlled winding method produces wire free from helix (twist), permitting welds that do not walk.

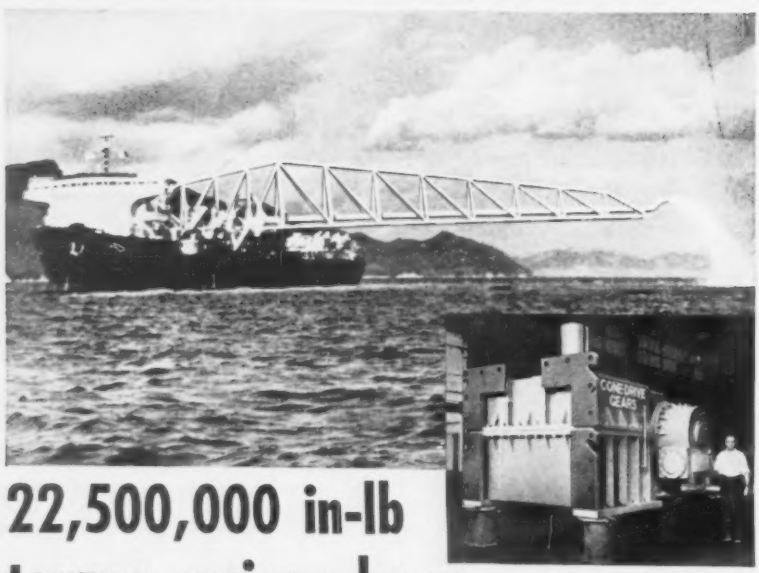
Aluminum SPOOLARC® is packaged with desiccant in sealed plastic bags to eliminate moisture, a common cause of porosity in welds.

OTHER METALS—silicon bronze, deoxidized copper, aluminum bronze, phosphor bronze, magnesium, and nickel. Available in SPOOLARC® form. For more information on SPOOLARC® and other ALL-STATE products, send for free 56-page Instruction Manual and SPOOLARC® literature.

Available from distributors everywhere.

All-State

ALL-STATE WELDING ALLOYS CO., INC.
White Plains, N.Y. Dial 914 WH 8-4646
QUALITY WITH SERVICE



22,500,000 in-lb torque swings boom

This ocean-going dredge "Zulia" has a 437' discharge boom that rotates 180° to pump waste beyond a channel project's limits. The Cone-Drive speed reducer that does the job is shown in the inset. Due to the **double-enveloping worm** gear principle, this compact housing is capable of producing 22,500,000 in-lb torque—sufficient to "stow away" the giant boom in a 75 MPH wind.

Powerful Cone-Drive worm gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

NEW PATENTS

Ferrous Treatment

Treatment of ferrous material, J. A. Charles (assigned to The British Oxygen Co. Ltd., London, England), Sept. 5, 1961. In the refinement of ferrous-metal melts, an arc is established between a tubular electrode and the melt. Then oxygen-containing argon gas is passed through the bore of this electrode onto the melt. Canadian 627,050.

Tough Cast Iron

High-toughness cast-iron for relatively thick castings, and a method to produce it, L. Peras (assigned to Regie Nationale des Usines Renault, Billancourt, Seine, France), Oct. 24, 1961. Method for producing a high-strength, malleable-iron casting containing a very large number of extremely fine, uniformly distributed, rounded graphite nodules. U. S. 3,005,736.

Makes Ore Magnetic

Method of converting iron oxide to magnetic oxide, L. J. Erck and T. E. Ban (assigned to The Cleveland-Cliffs Iron Co.), Oct. 24, 1961. This patent covers method for heating and partially reducing non-magnetic, iron-oxide ores to produce a magnetic material amenable to magnetic concentration methods. U. S. 3,005,699.

Refines Crude Iron

Blowing device for refining crude iron, R. Rinesch and K. Langer (assigned to Vereinigte Osterreichische Eisen- und Stahlwerke A.G., Linz, Danube, Austria), Nov. 7, 1961. Patent outlines a design for an improved blowing device for use in the oxygen refining of molten pig iron. The blowing tube is positioned on a pivoted carrier, so that the tube is always positively guided in a vertical position. U. S. 3,007,691.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Data on an Alloy

A new 36-page handbook contains a comprehensive survey of the various properties of a strong copper-zirconium alloy. The alloy consists of high-conductivity, oxygen-free copper and a nominal, 0.13 pct. high-purity zirconium. It was specially developed to combine retention of high strength at elevated temperatures with high conductivity. (American Metal Climax, Inc.)

For free copy circle No. 1 on postcard

Ball-Valve Line

Following the introduction of a new line of ball valves, a new brochure details the working parts and applications of this competitively-priced valve. The brochure includes photos showing how all working parts can be slipped out the bottom, in one piece, while the valve body remains in-line. Disassembled working parts of the valve and cartridge also are described, shown in photos and keyed in a diagram. (Crane Co., Industrial Products Group)

For free copy circle No. 2 on postcard

Controls Liquids

A four-page bulletin describes displacement and float-type Magnetrol liquid level controls; pneumatic and electric switching mechanisms; and Magnetrol Flow Switches. (Magnetrol, Inc.)

For free copy circle No. 3 on postcard

Conditions Soluble Oil

This new literature tells how a soluble oil conditioner is used to extend the life of soluble oil and make it pleasant to use throughout its life. Full application information is given together with ordering information. (The DoALL Co.)

For free copy circle No. 4 on postcard

Pumping Units

Both 6000 and 10,000 psi, 2-stage "Vanguard" hydraulic pumping units are fully described and illustrated in an attractive new four-color brochure. In addition to complete technical data the brochure covers a wide variety of available motors, valves and switches, which added to the basic pump unit gives the Vanguard what OTC calls "building block flexibility." (Owatonna Tool Co.)

For free copy circle No. 5 on postcard

Insulated Cables

A new technical brochure offers handy information on how a line of insulated cables should be used. It includes quick selection tables to aid in size specification. Also, typical test results for the insulation are given together with a listing of physical properties. (Anaconda Wire & Cable Co.)

For free copy circle No. 6 on postcard

Ceramic Casting Cores

Describing and illustrating the use of preformed ceramic cores in making complex castings, a new four-page bulletin is actually a reprint of a feature article. It tells how ceramic cores enable investment casting producers to meet the tight specifications demanded in hollow castings for aircraft and space vessels. (Sherwood Refractories.)

For free copy circle No. 7 on postcard

Stainless Steel

A new booklet features one company's stainless steel plate-making facilities. Following the theme of "A New Spectrum in Stainless Steel Plates," the booklet is designed as a comprehensive source of information on plate finishes, hand mill size limitations, and size ranges for

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **12/14/61**

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Company .....

Co. Address .....

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FREE LITERATURE

converted plates. The contents also include detailed tolerance charts on thickness, flatness, dimensions, and descriptions of additional testing services available through the company's metallurgical operations. (Eastern Stainless Steel Corp.)

For free copy circle No. 8 on postcard

Burner Data

A new 4 page bulletin, CCS-1, describes briefly a complete line of coordinated combustion equipment. Mixing, safety, burning, controlling, measuring and testing equipment is included in this quick reference to all industrial heating components. Each component is pictured and described with a notation of the detailed literature available. (Selas Corp. of America)

For free copy circle No. 9 on postcard

Cleaning Brushes

Technical data and specifications on new Tufmatic and Disc-Center brushes are now available in two new bulletins. The bulletins discuss typical applications, and give brush diameters, wire sizes, operating face sizes, face plate widths, trim length, maximum rpm and prices. (The Osborn Mfg. Co.)

For free copy circle No. 10 on postcard

Standard Cranes

A 12-page brochure describes a new line of pre-engineered standard cranes. The two-color brochure discusses bridge, trolley and hoist features and describes operation of the floor- and cab-operated cranes. The new line is tailored to the user's needs with the economy of pre-engineered and standard components. (Novo Industrial Corp.)

For free copy circle No. 11 on postcard

Hose Fittings

Just off the press is a newly revised and expanded, 12-page catalog on detachable, reusable hose fittings, assemblies, adapters and hose. The new catalog covers medium and high pressure, single and double wire braid hose for industrial uses. (The Lenz Co.)

For free copy circle No. 12 on postcard

Cartridge Toolholders

The addition of cartridge-type toolholders for carbide throw-away inserts to a line of cutting tools is announced in a new catalog. The catalog lists the features of this insert-cartridge system. It also presents detailed drawings and specs for each of five standard, basic cartridges. (Vascoloy-Ramet Corp.)

For free copy circle No. 13 on postcard

Electrical Connectors

The outstanding features of miniature non-environmental connectors are described in a new 10-page bulletin. These connectors are made especially for military and commercial applications where environmental characteristics are not required. The series is dimensionally identical, interchangeable, and can be mated with the CEC MIL-C-26500A series 600, 700, 800 and the CEC 620, 720, and 820 series. (Consolidated Electrodynamics Corp.)

For free copy circle No. 14 on postcard

Casting Service

A new four-page bulletin points the way to a quick casting service. What should be considered in a quotation? The answers are all here for fast interpretation. The bulletin lists hundreds of castings. Many materials are offered such as, gray iron, ductile iron, Ni-Resist, Ni-Resist ductile and many others. (Kutztown Foundry & Machine Corp.)

For free copy circle No. 15 on postcard

Chamfer Grinder

Bulletin 483-61 illustrates and describes a new automatic deburring and chamfering grinder for automatic transmission impeller hubs. The Model 483 chamfer grinder consists of a 48 in. diam, six-station index table mounted on a rigid base. (Michigan Tool Co.)

For free copy circle No. 16 on postcard

Comparator

A new four-page illustrated brochure describes an electronic gage block comparator, Model 130 B-12, graduated in 0.000001 in. Special features which eliminate gaging friction are described and shown, as well as other factors which contribute to the high sensitivity and accuracy of this instrument. (Federal Products Corp.)

For free copy circle No. 17 on postcard

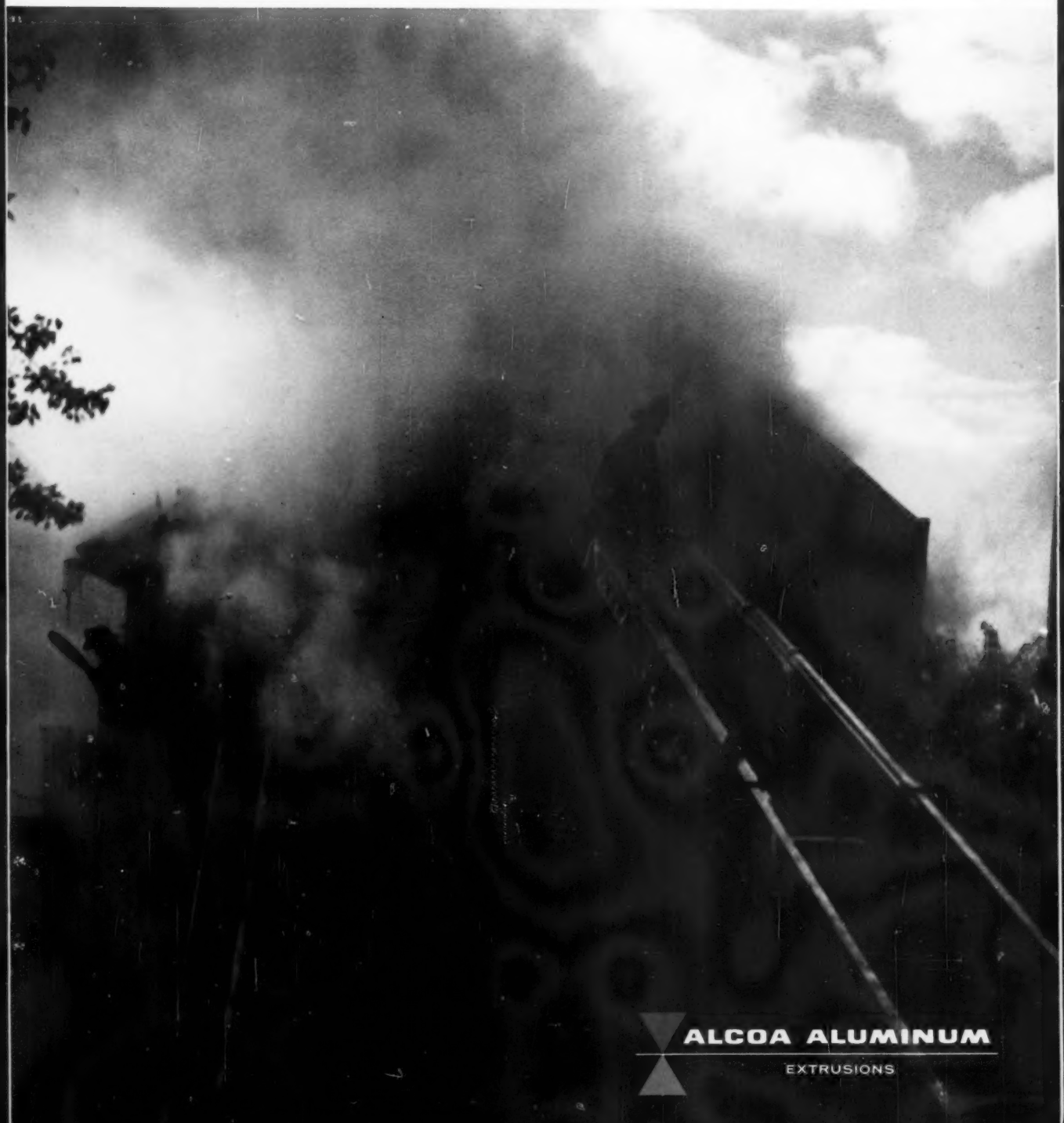
Thermocouple Catalog

A new 56-page catalog on a line of thermocouples for industrial application is available. The new catalog not only carries descriptive information on these products, it also includes engineering data concerning thermocouple usage and application. (Barber-Colman Co.)

For free copy circle No. 18 on postcard

When a 100-ft aluminum ladder stands a 20,000-ft-lb twist...

(Photo courtesy Bureau of Fire, Rochester, N. Y.)



ALCOA ALUMINUM

EXTRUSIONS

When a 100-ft aluminum ladder stands a 20,000-ft-lb twist . . .

that's Alcoa Total Ability at work!

With a 200-lb fire fighter perched at its tip, a 100-ft aerial ladder must stand up to torsional strains as high as 20,000 foot-pounds. Builder Peter Pirsch & Sons Co., Kenosha, Wis., gets the tensile strength of steel—*at one-third the weight*—from Alcoa* Aluminum Extrusions.

Less dead weight means quicker operation and greater safety for the ladder's live load. Its hydraulics cost less, too; pressure is lower, safer. Alcoa Aluminum will never rust, so needs no paint that might blister or peel.

By using metal most efficiently, Alcoa Aluminum Extrusions withstand exceptional stresses for their weight and section. Besides, they can save on machining, joining and assembly. Dies cost little, and Alcoa already has many for standard angles, bars, channels and shapes from H to Z.

Alcoa has turned out more than 150,000 different extruded shapes. We operate two of the world's largest extrusion presses: 14,000 tons. Five plants, coast to coast, make Alcoa the world's largest source of extruded shapes.

We're not only extrusion experts. Alcoa also makes castings, forgings, impacts and screw machine parts. So our only concern is doing your job best at least possible cost. That's how *Alcoa Total Ability* works, from the design on. How can we help you? Find out by calling your nearby Alcoa sales office; or write: Aluminum Company of America, 855-M Alcoa Building, Pittsburgh 19, Pa.

Entertainment at Its Best . . . **ALCOA PREMIERE** with Fred Astaire as Host . . . Tuesday Evenings, **ABC-TV**

ALCOA ALUMINUM

EXTRUSIONS

1. FLATBED TRAILER with extruded Alcoa Aluminum side beams gets almost two tons extra capacity, carrying loads as high as 50,000 lb.

2. UNLOADING BOOM for bulk carrier was made 66 ft longer, weighed 25 tons less after it was fabricated from Alcoa Aluminum Extrusions.

3. CONTINUOUS HINGE has top and body for instrument case extruded in Alcoa Aluminum as integral parts.

4. RETRACTABLE HYDROFOILS extruded in Alcoa Aluminum lift a 2,000-lb boat clear of the water, nearly double its maximum speed.

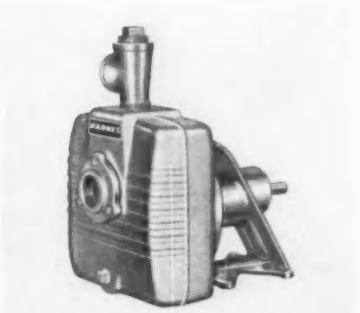
5. LOADING RAMPS of Alcoa Aluminum Extrusions easily support a moving load of 2,300 lb, weigh but 5.7 lb per ft.

6. ALCOA UNISTRENGTH* PIPE for mile-long line was welded at one station from 40-ft extrusions, dragged into place across mountains.

*Trademark of Aluminum Company of America

New Materials and Components

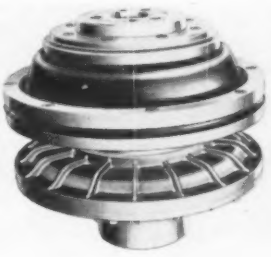
Self-Priming Pumps Feature Easy Maintenance



High capacities, high lifts and pressures, and fast, positive self-priming are all features of a new 31-model line of centrifugal pumps. These 1½-, 2- and 3-in. units come with aluminum or cast-iron construction. Capacities range from 5000-26,000 gal per hour. You can select the drive arrangement from a choice of gasoline, close-coupled electric, or universal and flexible-mounted electric types. In other words, there's a model that will adapt to most any application. Another feature is ease of maintenance. For example, the pumps have a removable volute that eliminates the need for a wear plate. When the volute wears out, its low cost replacement yields new pump performance. (Barnes Mfg. Co.)

For more data circle No. 21 on postcard, p. 127

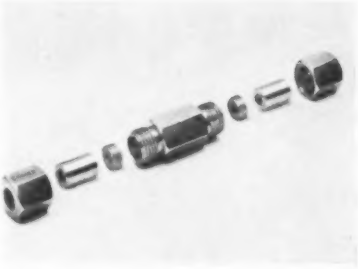
New Shaft Coupling Cushions Shock Loads



This new shaft coupling combines the advantages of fluid drive and a flexible cushion connector. Its high-speed flexing element compensates for angular and parallel shaft misalignment. It also absorbs end float, vibration and shock loads. In operation, the new coupling unit lets motors accelerate quickly. At the same time, it starts the load smoothly. As a result, smaller motors can be used on many industrial jobs, and upkeep of the driven equipment is held to a bare minimum. (The Dodge Mfg. Corp.)

For more data circle No. 22 on postcard, p. 127

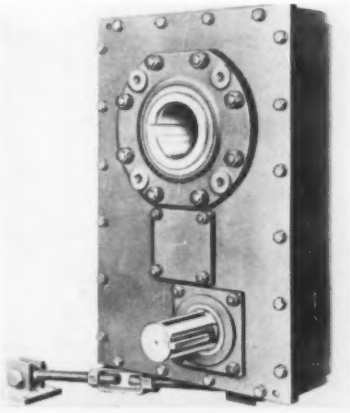
Unions Aid Pressure/Vacuum System Designer



Here's a new line of pressure/vacuum sealing unions and reducer unions for use where good design dictates an intermediate junction. Available in several different sizes, the unions can also be used to repair breaks or fractures in lines without replacing the entire tube. Thus you can use shorter lengths of tubing, or reduce and increase tubing sizes whenever necessary. The assemblies come with a variety of sealing materials. Construction is stainless steel. Temperature limit is 1850°F. (Conax Corp.)

For more data circle No. 23 on postcard, p. 127

Two Larger Models Top Gear-Drive Line



Two new models extend a line of shaft-mounted and flange-mounted drives to capacities up to 225 pct greater than previous sizes. Ratios of 15:1 or 25:1, ratings up to 125 hp, and output torque up to 100,000 lb-in. let these new units drive heavy-duty jobs. Still, there's no sacrifice of the installation ease and dependable performance provided by the smaller sizes. Construction features include a rugged steel housing with a minimum plate thickness of 1⅛ in. This housing protects rotating parts and keeps them in rigid alignment. Helical gears transmit high mechanical efficiencies of 97-98½ pct under full load. Extra-depth teeth and a high pressure angle provide more capacity and increased resistance to breakage. The new drive mounts on either a horizontal or a vertical shaft. Its high-speed end can be either up or down. (The Falk Corp.)

For more data circle No. 24 on postcard, p. 127

it's Jewel Bright
takes tough twists without
FLAKING, POWDERING, or PEELING

CONTINENTAL®
Brytite®
A PATENTED GALVANIZING PROCESS

CHAIN QUALITY WIRE

The Zinc Coated Wire with the Plated Look
Brytite Wire is so shiny bright and satin smooth that electroplating and special finishing operations are not needed —a valuable saving in labor and materials! The coating is so tight that it withstands severe deformation of the base metal—takes hard turns and twists without flaking, powdering, or peeling.

In Many Sizes, Finishes, Tempers and Analyses
Specify BRYTITE in Satin Finish, Unwiped, or redrawn (in certain sizes) . . . in various tempers and analyses in low carbon and medium low carbon steels . . . for quality weldless or twisted wire chain, or wherever long-lasting brightness is desired. Special shapes, too.

Free Manual of Continental Manufacturers' Wire. Contains details of BRYTITE and other types of Continental Wire. Write for copy.

Fine Finishes in Manufacturers' Wire
CONTINENTAL STEEL
CORPORATION—KOKOMO, INDIANA

PRODUCERS OF: Manufacturers' Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, BRYTITE, Annealed, Liquor-Finished, Bright, and Special Shaped Wire. Also Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

DESIGN DIGEST

Filter-Regulator

A new filter-regulator is actually a reducing-relief type regulator and an air filter combined into a single compact unit. This low-cost rugged unit comes in 0-25, 0-60 or 0-125 psi pressure ranges—all with 300 psi inlet pressure rating. It has excellent drop characteristics. And it provides accurate regulation regardless of flow or upstream pressure variations. Fuel flow is 20 scfm at 100 psi supply pressure. The large area filter removes particles as small as 10 microns. Units feature a die-cast aluminum housing coated with corrosion - resistant paint. Thus, the filter-regulator is suitable for use outdoors or in corrosive atmospheres. It can be line, wall or panel mounted. Single-bolt construction permits quick removal of the filter element for cleaning purposes. (Conoflow Corp.)

For more data circle No. 25 on postcard, p. 127

Zinc-Plating Process

Suitable for both rack-type and barrel plating, a new bright-cyanide, zinc-plating process uses a single non-metallic addition agent. It meets the varied demands of the zinc plater for an even-colored and bright deposit. The additive greatly increases the throwing power of a cyanide zinc electrolyte. This makes

deeply-recessed and "hard-to-throw" areas, easy to cover. In addition, the ad-

ditive is extremely tolerant to bath impurities. Current density of the system ranges from 2-130 amp per sq ft. (Westinghouse Electric Corp.)

For more data circle No. 26 on postcard, p. 127

Controls Motor Speed

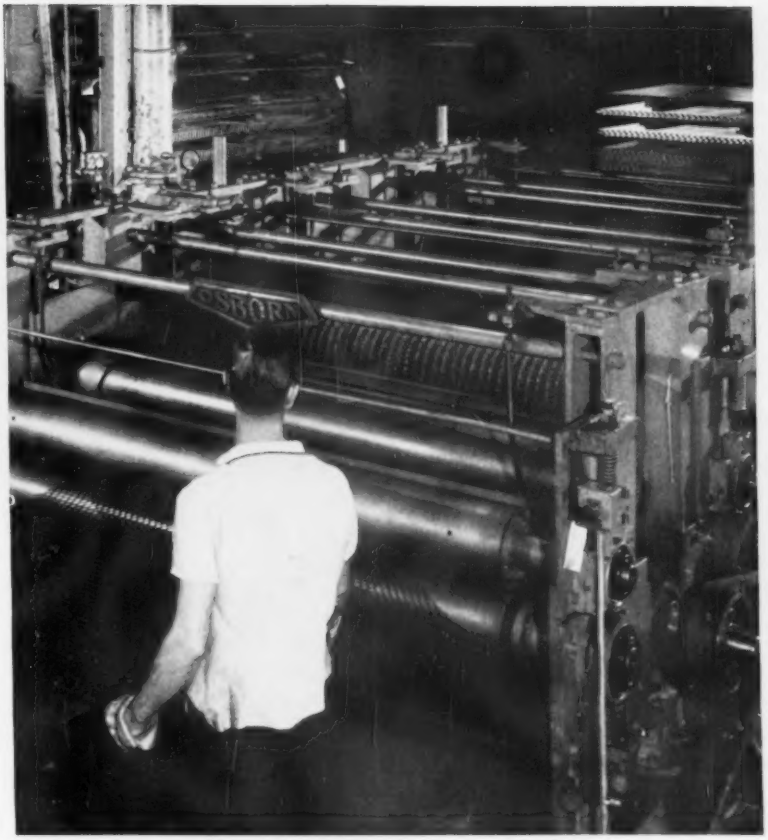
This new low-cost, motor-speed controller boasts a feedback signal in the control loop. Constant torque at all speeds is provided through use of the servo principle. And this precise speed control is maintained regardless of wide load fluctuations. Motor speed may be varied over a 15:1 speed range in the torque without any change in the torque. The control unit is built from

standard components to provide long and reliable service. (Copy Research Corp.)

For more data circle No. 27 on postcard, p. 127

Roll-Formed Sections

Entry into the specialty field of miniature roll-formed metal sec-



FOUR-STAND POWER BRUSHING MACHINE automatically deburrs and edge-blends top and bottom of expanded metal sheet in one cycle. Sheets are passed through four quadied knot-type Osborn brushes. Pressure on each brushing head can be adjusted individually. Output per 8-hr. shift: 40,000 sq. ft.

COMPETITIVE EDGE for expanded metal . . . it's deburred with OSBORN power brushing

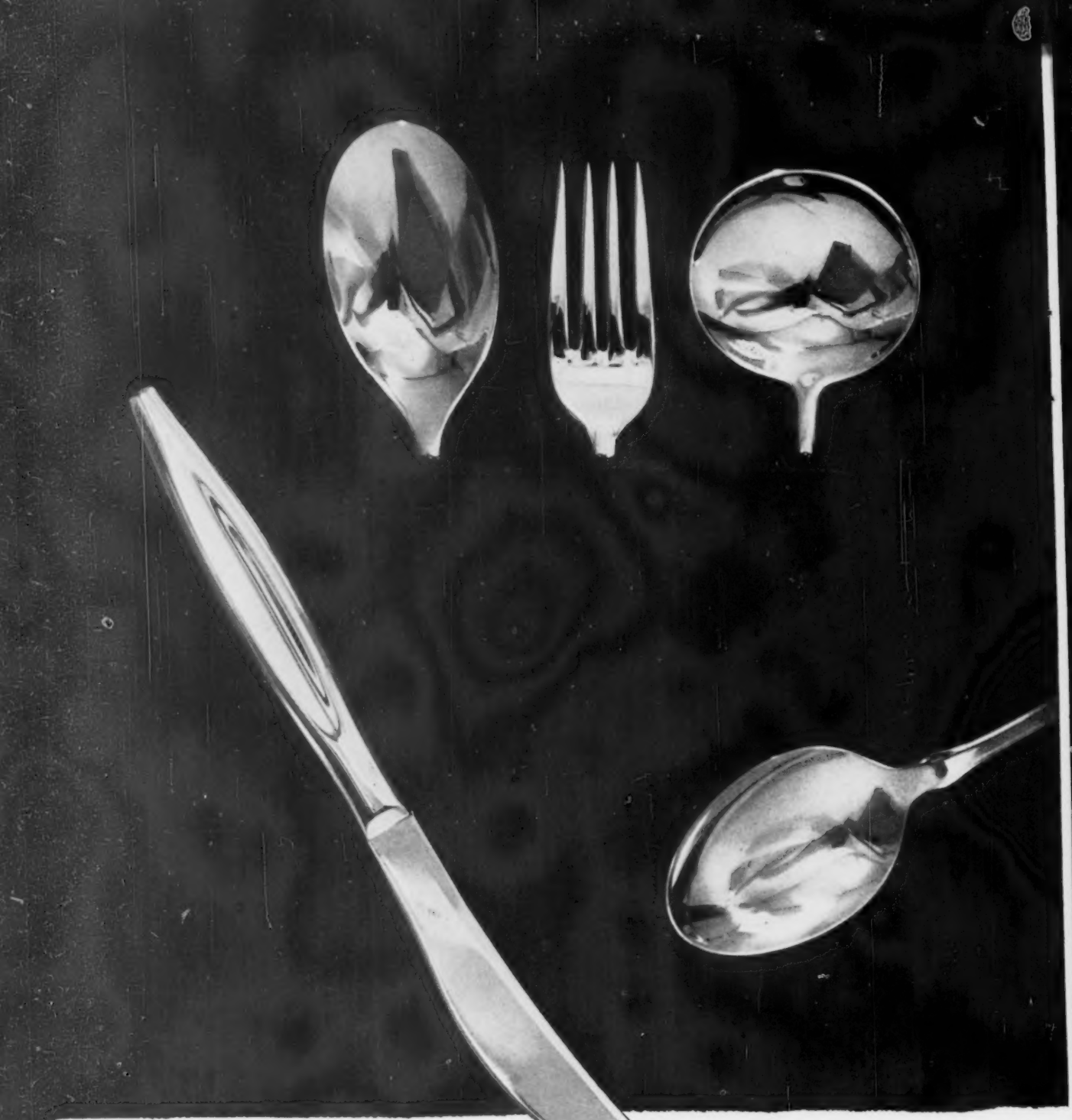
Problem: This manufacturer of expanded metal products needed a fast, economical way to produce burr-free expanded metal sheet.

Solution: Four standard Osborn finishing machines were used as "building blocks" to develop this special in-line finishing unit. Brushing is done by four quadied knot-type Osborn brushes. Sheets are fed through the machine automatically at rate of 50 fpm—emerge completely burr-free and edge-blended on both sides after just one pass. They report the method is fast, simple, inexpensive . . . gives them a definite product quality advantage over competition.

Today's advanced Osborn power brushes and brushing methods can help you boost output, improve quality, reduce cost on metal finishing jobs of every type—deburring, cleaning, polishing, precision blending. An **O**sborn **B**rushing **A**nalysis can show you how. Write or call *The Osborn Manufacturing Company, Dept. F-118, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery



What the flatware story means to you

PHOTO BY ROBERT C. HOFFNER

The elegance and exquisite beauty of Stainless Steel is steadily gaining in favor with the manufacturers of flatware. America's leading tableware craftsmen are specifying Sharon Stainless Steels more than ever. They find it easy to work with and like the natural patina it develops with age and use. In fact, they have found it to be the answer to the threat of foreign imports. For lasting durability, with an accent on product beauty, you'll be sure to find other manufacturers of high quality products also thinking Stainless Steels . . . and specifying them from the *Sharon Steel Corporation, Sharon, Pennsylvania.*

SHARON *Quality* **STEEL** SHARONSTEEL®

AMERICA'S FOREMOST PRODUCER OF LIGHT STEELS

STRIPPIT FLEX-O-DRILL CUTS TIME IN HALF

STRIPPIT Flex-O-Drill Drilling-Layout machine offers you low cost, quality equipment that drills, reams, center punches and scribes within ± .002″ accuracy. Designed for template layout and drilling, it's also ideally suited for pilot runs and short run production. A new, inexpensive accessory utilizing a high quality optical instrument converts the Flex-O-Drill to an accurate machine for checking drawings, patterns, templates or production pieces.

STRIPPIT Flex-O-Drill permits you to work directly from a chart of *x* and *y* coordinates...no need to make base line drawings. Adjustable steel tapes quickly set up coarse dimensions. Quick-set Micrometric Gages provide fast, accurate adjustment to thousandths. Result... template making time slashed as much as 50% or more.

STRIPPIT Flex-O-Drill can be operated by anyone with only a few minutes of study. Let our STRIPPIT Tool & Methods Engineer explain the finer points of the Flex-O-Drill and demonstrate it in your plant. Or write for catalog FD.

WALES **STRIPPIT** INC.
202 Buell Road • Akron, New York

HOUDAILLE INDUSTRIES INC.

In Canada: Strippit Tool & Machine Company, Brampton, Ont.; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Trecker—C.V.A. Ltd., Hove, Sussex, England

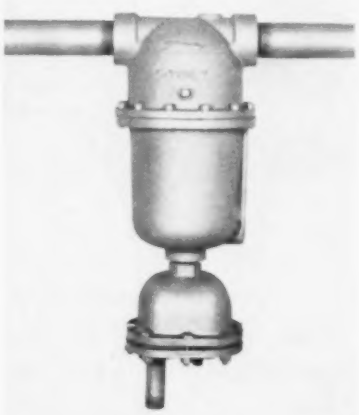
tions was recently announced by Universal Molding Co. Keyed to industrial uses, including special applications in the missile and elec-

tronic fields, many of these new "smaller than a peanut" items are maintained in stock. Others are produced on a custom basis. According to its president, the company maintains the largest-in-the-nation inventory of light-gage roll-formed aluminum angles, channels and tubes. These include a large variety of shapes and sizes.

For more data circle No. 28 on postcard, p. 127

Separator-Trap System

Here's a new low-cost system for the removal of oil and water from



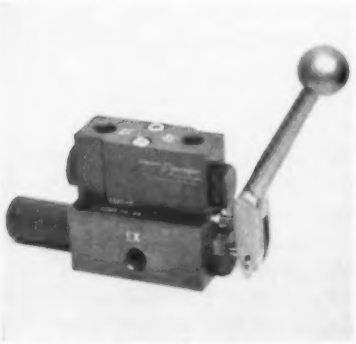
compressed-air, gas and steam lines. This insures delivery of high-purity media at the point of use. Manufacturers, power producers and others are thoroughly familiar with the

problem of equipment damage caused by free moisture coming through pressure lines. Often, however, the cost, bulk and upkeep involved with much of the available entrainment-removal equipment discourages its use. This new system is both lightweight and compact enough to be installed and supported in the line at any point. It consists of a T-type separator combined with the proper trap for a particular installation. Engineers point out that installation of a trap alone is not sufficient. (Wright-Austin Co.)

For more data circle No. 29 on postcard, p. 127

Four-Way Valves

Providing completely reliable operation at low cost, new ¼-in., lever-operated four-way valves particularly suit situations where space is a critical factor. Their compact-



ness is indicated by the fact that a bank of eight valves without handles measures about 2 x 6 x 14 in.. A single valve weighs only 18 oz. The valves are available in 12 portings for foot, subplate and tandem mounting in series or parallel banks. Designed for use with hydraulic oils and other non-corrosive fluids at pressures up to 3000 psi, the units provide long-service life with low internal leakage and low pressure drop. (Sarasota Precision Products, Inc.)

For more data circle No. 30 on postcard, p. 127

Filters Radioactivity

Here's a new dry-type air filter that's particularly engineered to remove radio-active particles from fresh outside air. It's ideal for use with fall-out shelter ventilating sys-

Are you buying LAMINATED PLASTICS or VULCANIZED FIBRE... as raw materials or fabricated parts?

TAYLOR FIBRE CO. HAS 2 MODERN PLANTS TO SERVE YOU

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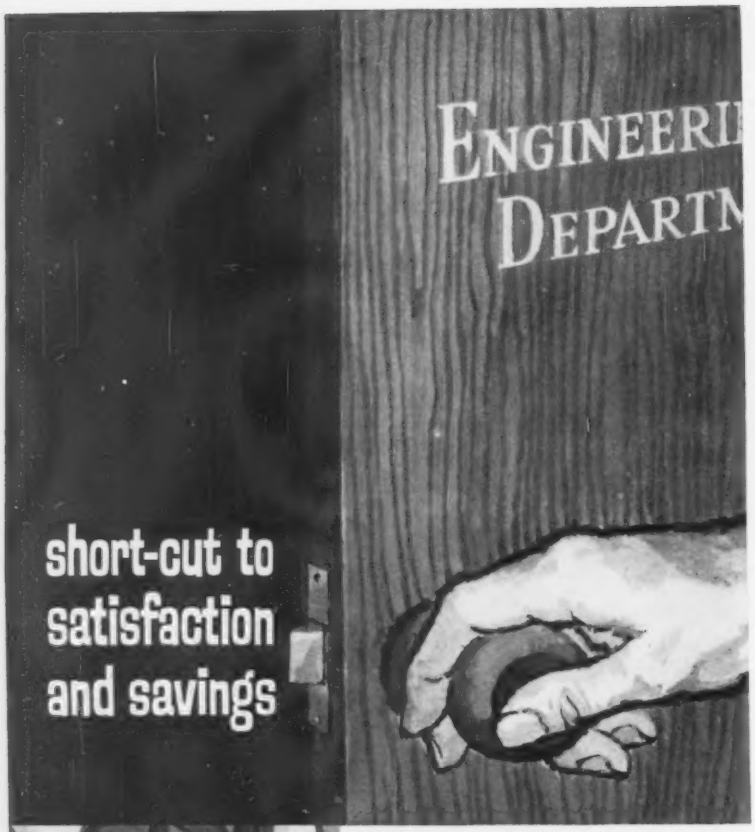
Taylor has the products . . . offers more than 50 grades of standard laminates, a group of Tayloron® materials, pre-impregnated materials, molding compounds, and vulcanized fibre. Also filament windings and a number of composite materials, including sophisticated combinations of laminates, metals and rubbers.

Taylor has the facilities. Its Norristown, Pa., plant, comprising some 300,000 sq. ft., produces both vulcanized fibre and laminated plastics . . . is one of the most completely integrated in the industry . . . even makes its own paper and a large percentage of its own resins. The La Verne, Calif., plant, with over 45,000 sq. ft. of floor space, specializes in the manufacture of laminated plastics for the convenience of West Coast customers. Both plants can supply basic materials or parts fabricated from them.

Taylor has the service organization . . . maintains 13 strategically located offices staffed with men qualified to help in the selection and utilization of Taylor materials.

Write for a copy of our laminated plastics selection guide and other literature pertaining to our capabilities for producing materials and parts to your specification. Taylor Fibre Co., Norristown 52, Pa.

Taylor
LAMINATED PLASTICS VULCANIZED FIBRE



Rolled Steel Rings of simple or complex cross-section can be produced by the Edgewater process, in diameters from 5 to 145 inches. Materials include carbon steel, stainless and heat-resisting alloys, tool steel.

Edgewater's first step in answering an inquiry for rolled steel rings is to have Engineering check the proposed design for possible modifications that would improve the ring and/or reduce the price. This assures a good design—one that meets all requirements, at lowest cost.

Forged from solid blocks of steel and rolled on a powerful ring mill, Edgewater weldless rings are formed to cross-section shapes so close to finished dimensions that very little machining is needed. Close tolerances mean less labor, less scrap loss, lower overall costs. The Edgewater rolling process assures maximum strength, toughness and uniformity. Send drawings for recommendations and prices.

INTERESTING description of the ring-rolling process is given in this brochure, **Edgewater Rolled Steel Rings.** We will be glad to send you a copy.

Edgewater Steel Company

P.O. Box 478 • Pittsburgh 30, Penna.

DESIGN DIGEST

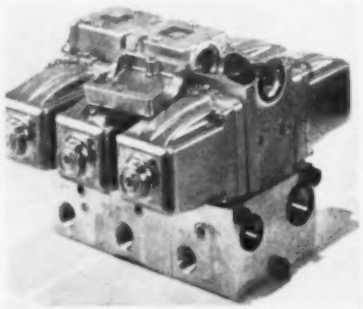
tems. Available with standard MPT connections, the filter provides fast, easy mounting on 3-in. intake and exhaust pipes. Rated capacity is

60 cfm, more than sufficient for supplying the 3 cfm of fresh air recommended per person. The filter consists of highly-efficient Dacron media encased in corrosion-resistant aluminum-screen cloth. This cloth is deeply pleated to provide maximum filter area and minimum back pressure. Dacron is mildew-, rodent- and insect-proof. Resilient plastic end seals give the filtering element positive, airtight sealing. Its cadmium-plated weather-proof hood has a baked-enamel finish to completely protect the media from the elements. Hardware is also cadmium-plated. (Air Maze Div., Rockwell-Standard Corp.)

For more data circle No. 31 on postcard, p. 127

Stacks Up Valves

New manifold sub-plates are suitable for single mounting or stacking



of Beckett single- or double-solenoid air and hydraulic valves. The sub-plates are available either in machined brass or aluminum, with

bottom or side porting. Compact design lets you stack the valves on 2⅝-in. centers. Sub-plates are held together by tie rods and have "O" ring seals in between for making up multiple manifolds. Valves may be added or taken away at any time. Manifolds may be pressure connected and exhaust connected from both ends for large capacity requirements. (Beckett-Harcom Co.)

For more data circle No. 32 on postcard, p. 127

Speeds Drilling Jobs

Ball bearing precision delivers accuracy never before realized on drill speeder equipment. Simple and rugged construction of the units reduces maintenance to a minimum. The new drill speeders can be used in manual, semi or completely automated operations on all types of drilling machines. Recommended spindle speeds of from 1200 to 3200 rpm will produce maximum drilling speeds up to 20,000 rpm. (Tapmatic Corp.)

For more data circle No. 33 on postcard, p. 127

Locknut

One-piece and all-metal, a new "commercial" locknut of the prevailing-torque type comes in a wide range of sizes. Those currently offered range from #10 through ½ in. with UNC and UNF threads. Other sizes will be available soon. The new locknut is made from heat-treated alloy steel. This gives high strength without bulk, and enough elasticity for repeated reuse without impairment of the locking action. Locking is effected by a slight deformation of the top threads into elliptical shape. As the nut is assembled, the out-of-round threads tend to conform to the circular pattern of the mating threads. Friction on the flanks of the nut threads creates a positive, powerful locking grip. Other advantages include Class 38 threads, temperature resistance to 550°F., conformance with military specs, tensile strength in excess of 250,000 psi, and a built-in flange which saves washer cost, speeds assembly and reduces indentation. (Allen Mfg. Co.)

For more data circle No. 34 on postcard, p. 127

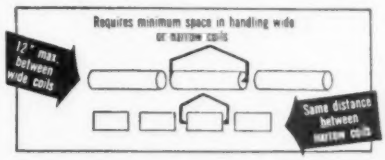
Handling Coil Stock?

CHECK THESE

C-F LIFTER ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles – a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.



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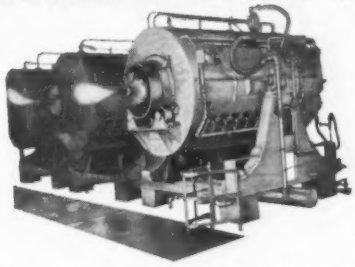
AGF
ROTARY CARBURIZERS



AGF's Work in Motion Principle Assures Uniformity of Case!

AGF Rotary Batch Carburizers provide the most reliable method for DEEP CASE CARBURIZING and LIGHT CASE HARDENING.

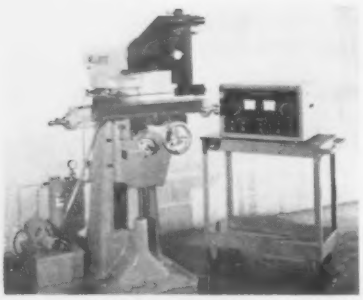
Recent AGF combustion and control system improvements provide an even greater degree of temperature and product uniformity than was ever before possible.

For POSITIVE COST REDUCTION and PRODUCT IMPROVEMENT, investigate the NEW Improved AGF Rotary Carburizers.

Write for catalog IA 607 today

AMERICAN GAS FURNACE CO. 1004 LAFAYETTE STREET, ELIZABETH, N. J.

New Equipment and Machinery



Unit Machines Reproducible Test-Specimen Defects

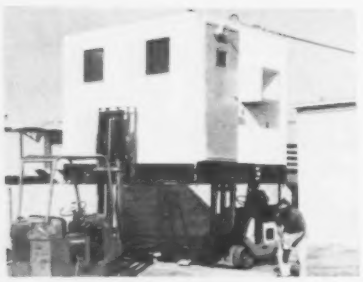
Here's a new machine tool that produces crack-like and pin-hole "defects" in sheet, tubing and other mill products. It's ideal for fabricating calibration standards for use with ultrasonic and eddy-current inspection equipment. Using the electric-discharge principle, the newcomer will etch highly reproducible defects in all metallic materials evaluated to date. For example, precision notches 0.002-in. wide x 0.030-in. deep x 1-in. long can be placed anywhere on a sheet or bar, or up to 14 in. inside of any tube with 3/8-in. or larger ID. (Metcut Research Associates, Inc.)

For more data circle No. 35 on postcard, p. 127

New System Automates Heat-Treating Cycles

With this new automatic control system for heat treating, a standard punched card is the job ticket. Here's how it works. The proper department prepares a punched card that sets up treatment factors for specific metallurgical results. When the work arrives at the furnace, the operator merely puts the card in the control panel. He can't treat the work without putting the card in. He can't put it in wrong. From here on, the automatic system takes over. It adjusts dew points, time carburizing and diffusing periods. It also controls quench type and timing. When the work moves on, its punched card goes with it. This card becomes a permanent record of the treatment given. (Lindberg Engineering Co.)

For more data circle No. 36 on postcard, p. 127



Portable Clean Room Prevents Air Contamination

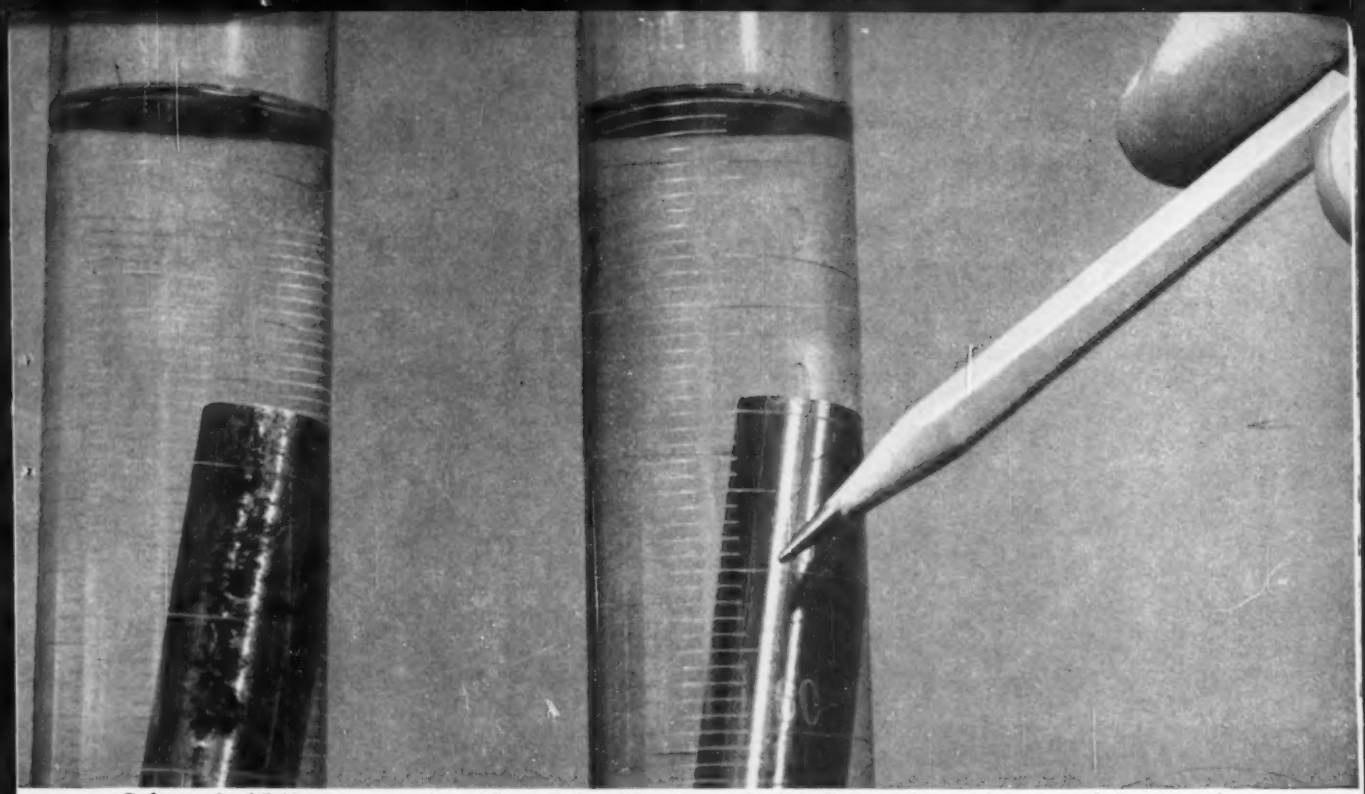
This new portable clean room is shipped fully assembled and ready to operate. Sterile air circulates through its chamber at a constant 1-mph flow rate which provides almost immediate clean down of the internal atmosphere. Clean air flows toward the worker and out of the room below bench level. Thus dust or lint falling from his person cannot reach the work area. In fact, personnel can come or go at will without affecting cleanliness of the work. There's no need for "special" garments. (Agnew-Higgins, Inc.)

For more data circle No. 37 on postcard, p. 127

Electromagnetic Machine Applies 50,000 Psi

The first commercial electromagnetic metalforming machine is now on the market. This new metalworking tool employs lightning-fast bursts of electromagnetic force to assemble, attach and shape metals quickly. Its powerful magnetic field is applied in pulses of 10-20 millionth of a second, creating pressures ranging up to more than 50,000 psi. These giant pressures can be used to collapse, shrink or compress tubing, to attach terminal connections onto cables, or to swage sections of telescopic tubing. The magnetic pressure will also expand tubing to form a tight-fitting bearing, hub or bushing. Since you never need to bring the workpiece into physical contact with the magnetic field coil, there's no danger of scratching, marring or other surface damage. Easily interchangeable coils make the new machine highly versatile. (General Dynamics Corp.)

For more data circle No. 38 on postcard, p. 127



Carbon steel rod (left) rusts in water after two hours. Rod on right is immersed in Shell Dromus solution. It has not rusted after six months.

REPORT:

Shell reports on ten features of Dromus Oils that can help you reduce cutting time and costs

THE Shell family of Dromus® Oils includes both solution-type and emulsifiable cutting fluids.

Each Dromus product has its own area of application—depending on water hardness, metal characteristics and specific job requirements. However, the entire range of Dromus Oils offers these ten benefits:

1. Dromus Oils are concentrates. They are designed to be mixed with the proper quantity of water at point of use for optimum results.

2. Dromus Oil emulsions resist foaming even under most severe conditions.

3. Dromus Oils contain an effective germicide. Result: less danger of rancidity and bacterial growth.

4. Dromus Oils do not separate. Even when mixed into emulsions containing more than 50 parts' water, Dromus Oils maintain their stability.

5. Dromus Oils prolong grinding wheel life. They prevent the wheel from "loading up" with metal from the work.

6. Dromus Oils provide effective corrosion protection for tool and workpiece. (See photograph above)

7. Dromus Oils permit greater dilution than many soluble oils.

8. Dromus Oils wash away metal chips with high efficiency. Chips then settle out of the emulsion.

9. Dromus Oils can be kept in the machine during plant shutdowns.

10. Dromus Oils are made under strict controls. Manufacture of Shell Dromus Oils is scientifically controlled.

There is a Dromus Oil for your cutting, sawing, boring, threading, milling or grinding need. Call your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

SHELL

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—where 1,997 scientists are working to provide better products for industry.

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December 1, 1961

740,000 Shares

The M. A. Hanna Company

(A Closed-End, Non-Diversified Investment Company)

Common Stock

(par value $2.50 per share)

Price $34 per share

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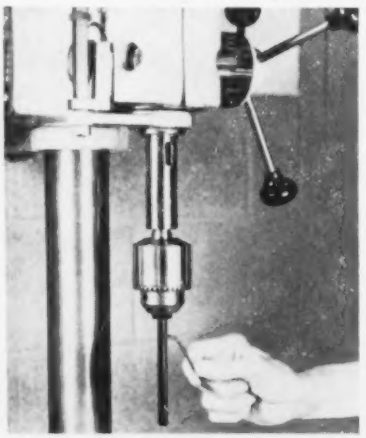
NEW EQUIPMENT

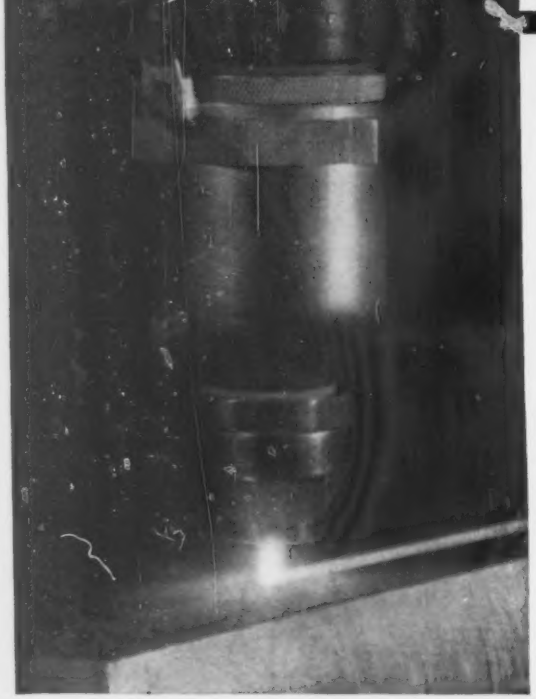
Burring Tool

Used by various industries for deburring and chamfering both sides of a hole in one operation,



this advanced burring tool features a new design. While the tool's operation remains the same, construction has been greatly simplified and improved. The tool now consists of only four parts, instead of the former eight parts. Now, mandrel,

LINDE ELECTRIC WELDING



PLASMARC

NEW... FIRST PROCESS FOR HIGH-SPEED, DROSS-FREE CUTS IN 5-IN. METALS

LINDE, inventor of plasma arc processes, now introduces *advanced* PLASMARC cutting for high-speed severing of metals up to 5 in. thick, dross-free.

PLASMARC cutting utilizes an intense plasma jet (20,000°F.) of near-sonic-velocity (4000 ft./sec.), which melts-and-forces a narrow kerf through the metal. After six years' success, it is now replacing shearing, sawing, powder cutting—slower methods which usually require machining of the cut edge. *PLASMARC cutting delivers these advantages:*

- Dross-free cuts in stainless steel (2 in.), aluminum, magnesium, copper up to 5 in. thick.
- Clean-cuts 4-in. stainless, nickel, carbon steel (without iron powder), "Monel," "Inconel," cast iron, high-alloy and clad steels.
- High-speed cutting—up to 300 ipm.
- Precise cuts—holds tolerances to 1/16 in.
- Narrow heat band—as thin as .006 in. wide.
- Little or no change in metallurgical properties.

For full details, contact your local LINDE office or write direct.

LINDE COMPANY
Division of Union Carbide Corporation
270 Park Avenue, New York 17, New York

UNION CARBIDE

STEELMAKING AT JESSOP

Survival? It could depend on a 3,000-mile picket fence

Ever-vigilant sentinels against surprise attack are the radar installations along the DEW Line. Stretching 3,000 miles across Canada and Alaska, this electronic fence is our first line of defense.

At bleak, lonely outposts Air Force and civilian technicians watch for tell-tale blips on radarscopes—Distant Early Warning of the possible approach of enemy aircraft or missiles.

This all-weather system must withstand the worst of the elements—sub-zero temperatures, high velocity winds, rain, snow and ice storms common to the Far North. And dependability of the equipment could determine whether or not we survive an attack.

There are numerous applications for specialty steels made by Jessop Steel Company in DEW Line installations. For example, forging quality alloys and wear-resistant tool steels for the gear mechanism of a rotating surveillance radar; cast-to-shape steel for certain other component parts and precision ground steels for delicate instrumentation.

Jessop is keenly aware of the importance of built-in dependability in the steelmaking process—whether meeting specifications for steel to be used in the nuclear reactor of a Polaris-firing submarine; a Redstone missile to launch an astronaut; an earth-girdling satellite; or a DEW Line radar installation.

Yes, for dependability, you can rely on Jessop . . . the *big* name in specialty steel.

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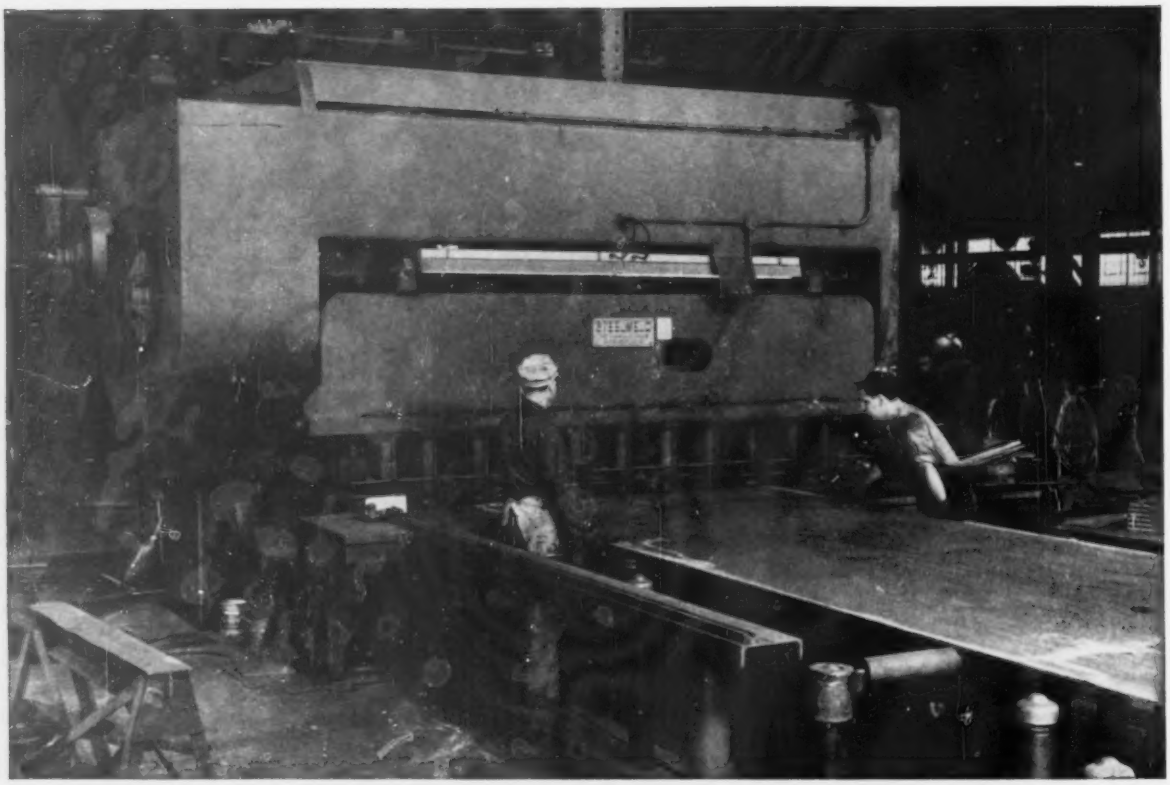
JESSOP



A complete line of machines is available for shearing plates of all thicknesses to 2" and lengths to 30'-0".

Pivoted-Blade Shears Outstanding for Heavy Plates

WHILE Steelweld Shears are used in hundreds of plants for cutting every gauge of metal, it is on heavy plate where the easy accurate cutting action of the machine is really eye catching. With nothing more than a quick "oomph" the knife goes through the metal quickly and cleanly, seemingly without effort. The resulting cut edges are straight and sharp.

Steelweld Shears are now cutting steel up to 2 inches thick. A wonderful feature is the ease and speed with which the heavy plate machines can be adjusted to cut the lightest gauge metal. In a matter of seconds the clearance between the knives can be reduced to that known to provide the best result for the thickness of the plate being cut. This is done simply by turning a crank until a gauge indicator is on the correct thickness figure. This feature is known as MICRO-SET knife adjustment and is the talk of the industry.

Production is fast on Steelwelds because they are heavily built to enable high operating speeds. Also, they are equipped with electric foot control. This reduces operator fatigue and often eliminates many steps he must take to the machine.

If you want the most modern machine, with outstanding features that make for the finest in all around performance — tried and proven features, some of which are not obtainable in any other shear — we invite you to get the facts on Steelwelds.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

4847 EAST 282ND STREET • WICKLIFFE, OHIO

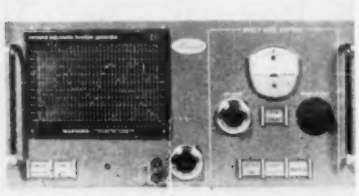
STEELWELD PIVOTED BLADE **SHEARS**

blade, spring and set screw do the trick. In operation, the tool deburrs and chamfers the front side of the hole upon entering. Then the blade depresses and passes through the hole and then extends. Next, the tool deburrs and chamfers the reverse side of the hole. For withdrawal, the blade again depresses to pass through the hole. (Cogsdrill Tool Products, Inc.)

For more data circle No. 50 on postcard, p. 127

Programming Unit

An automatic programmer with the inherent reliability required for automatic process control is now on the market. The newcomer makes it possible to automate any existing control system which uses a set-point potentiometer. It provides a continuous output which can be any time-variable function. The



programmer uses 34 tabs which move in a vertical column. Each tab has 100 positions. Programming is accomplished by manually positioning the tabs. Once the program is drawn in this manner, the output will then follow the program as an exact function of time. Programs may be adjusted during the test, making it possible to trim each tab during a slow pre-test. In this way, you can obtain the exact process output desired and eliminate time-consuming, trial-and-error runs. The time for one cycle is continuously adjustable over a wide range. (The Marquardt Corp.)

For more data circle No. 51 on postcard, p. 127

Plating Machine

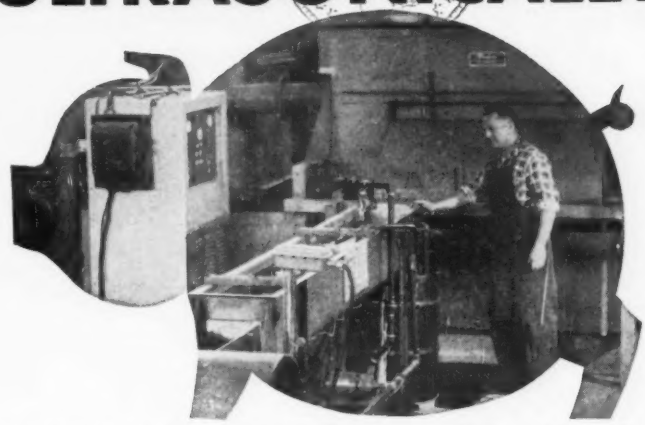
Made by Metallic Industry N.V., Loosdrecht, The Netherlands, a fully-automatic machine handles galvanizing and other surface treatments of metals. It performs the following sequence of operations: Suspension and removal; electrolytic degreasing; cold rinsing; acid bath, cold rinsing zinc, cadmium or nickel plating; cold rinsing; passivating or acid bath; cold rinsing; decolorizing, chromium or brass plating, cold rinsing, and finally hot rinsing. Circular in shape, the machine is available in several models from 13-19½ ft in diameter. (The Netherlands Trade Commission)

For more data circle No. 52 on postcard, p. 127

Speeds Parts Assembly

Here's a new, versatile and simple system of assembly line operation. It covers every human factor involving and influencing operators and the speed and quality of their work. It is the result of ten years of time and motion study. Basically, the system consists of production-station units and accessories which fit the requirements of parts assembly. To minimize capital costs, these units are made of formed sheet

HOW TO SAVE
$17,360 per year
ULTRASONICALLY



An experimental installation for removal of residual smudge from shot blasted strip by means of ultrasonics. A joint project of Pangborn Corp., Wean Engineering Co., Inc., and Branson Instruments, Inc.

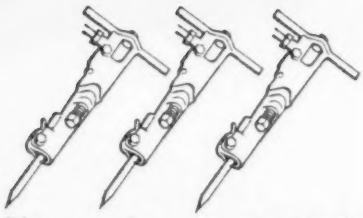
The shotblast method of descaling strip is becoming more and more popular, especially among the lower tonnage producers, converters and fabricators. In this process, hot bands are descaled in a blast cabinet with abrasive shot.-Today ultrasonic cleaning is on the way to replacing flash pickling. This method, which eliminates stream pollution and acid disposal, offers many extras:

• LOW INITIAL INVESTMENT (for tanks due to inexpensive steel construction) • LOW MAINTENANCE COSTS • LOW OPERATING COSTS (in terms of heat and power input) • REDUCED OPERATING TEMPERATURES • LITTLE OR NO CORROSION • NO FUME REMOVAL • NO ACID DISPOSAL • SPACE SAVING (ultrasonic installations are shorter in length).

Branson's highly experienced, factory trained specialists stand ready to assist you anywhere in the U. S. Tell us about your particular problem and Branson's enginering department shall try to find the best possible solution in the shortest possible time.

SINCE 1946 — THE RESPECTED NAME IN ULTRASONICS
BRANSON INSTRUMENTS, INC.
Ultrasonic Power Division
23 Brown House Road, Stamford, Conn.

The Porter Alloyist delivers the right alloy IN THE SPOTS THAT COUNT

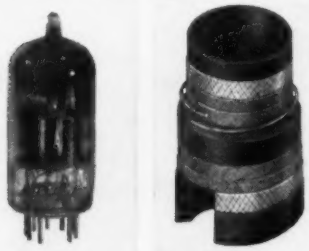


There can be no compromise in metals for those tougher, tool-killing jobs. That's why the Porter Alloyist recommends Grade D phosphor bronze for the rifle nut in air hammers . . . the critical part of the tool that absorbs hundreds of vibrations a minute at high impact pressure. Produced at a special temper, this alloy has the required toughness and durability to do the job and to help keep tool maintenance costs low.

THE PORTER ALLOYIST IS A SPECIALIST IN A WIDE RANGE OF SPECIAL METALS

Porter's Riverside-Alloy Metal Division is your single reliable source for specialty alloys in 8 basic groups of wire, rod and strip . . . phosphor bronze, nickel silver, cupro nickel, brass, stainless steel, nickel, Monel and Inconel.

Ask for a free copy of "Alloys for Industry" describing our wide range of specialty alloys. Write H. K. Porter Company, Inc., Riverside-Alloy Metal Division, Riverside, N.J. Or contact our sales offices in Hartford, Chicago, East Orange, Atlanta, Cleveland, Detroit, Cincinnati, Los Angeles and Rochester.



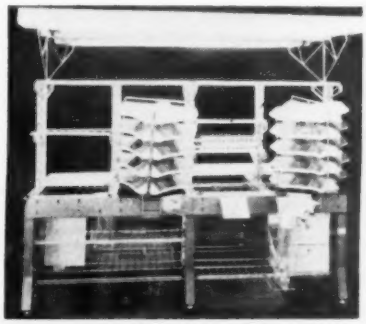
PORTER nickel wire is used extensively in vacuum tubes and in other components for the electronics industry.

PORTER carbon steel wire reinforces hose for air hammers and other industrial equipment.

PORTER

RIVERSIDE-ALLOY METAL DIVISION
H. K. PORTER COMPANY, INC.

steel that is cut, punched, formed and resistance welded to secure required stability. This is kindred to the "erecto principle," and as in steel building construction, it con-

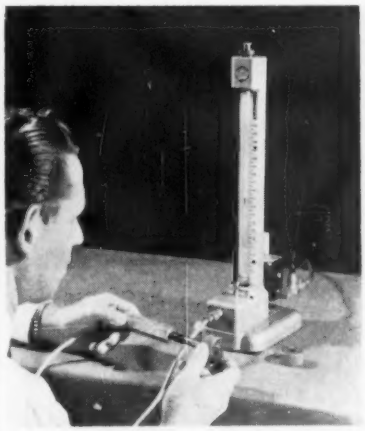


stitutes the framework structure. Support of the accessories consisting of cup assemblies, tool positioners and work surfaces is simple. They're all attached to the basic structure through a fast, simple "hook-on" design. (Kina-Technic International Corp.)

For more data circle No. 53 on postcard, p. 127

Compact Air Gage

Recently added to a line of these items, a new, compact, economy-model air gage handles single-dimension inspection. The unit weighs only 5 lb, stands 18-in. tall and requires less space than is covered by the spread of a hand. Goal of the developers was to bring the ad-



vantages of low-cost accurate air gaging within the reach of all metalworking plants. The unit's compact size and light weight make it ideal for use on a crowded surface plate. By the same token, the gage is easy to move from machine to machine. Standard amplifications are 1000, 2000, 5000 or 10,000:1, but the price is the same for each. In addition, standard conversion kits permit change from one amplification to another within a minute or two. (The Sheffield Corp.)

For more data circle No. 54 on postcard, p. 127

Profiling Machine

Small profiling, milling, recessing and routing operations can be performed with ease and precision on a new vertical-spindle milling machine. Adjustable stops are provided to control the operation in all directions and keep lost motion to a minimum. These include stops on the vertical slide to control the depth

of cut, stops on the horizontal slide to control length of the crosswise movement, and an adjustment on the table mechanism to lengthen or shorten the stroke. Collet capacity is $\frac{3}{8}$ in., cross travel is 2 in., longitudinal travel is 4 in. and vertical travel is 2 in. Standard equipment consists of a $\frac{1}{3}$-hp drive motor, pump, follower spindle, follower-spindle master cutter, follower-pin collet and the follower pin itself. (The Wade Tool Co.)

For more data circle No. 55 on postcard, p. 127

Speeds Up Threading

This fully-automatic threading attachment speeds up threading operations and takes the operator skill out of threading on one manufacturer's line of chuckers. According to the company, the unit will assure you of consistent, high-precision

WYCKOFF

Total Quality and Metallurgical Control

in every step of processing

is your continuous assurance of

ULTIMATE MACHINABILITY
—in any type of screw machine or lathe

HIGH PRODUCTION RATES
—of closely dimensioned, accurate parts

LONGER TOOL LIFE
—requiring fewer tool grinds; minimum downtime

SUPERIOR SURFACE FINISH
—insuring close control of finished parts

CORRECT PHYSICAL PROPERTIES
—to meet your specifications

Our metallurgists will be glad to help you in the selection of the best analyses for your specific operations.

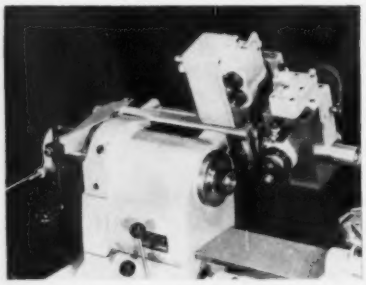
Steel

WYCKOFF STEEL COMPANY

GENERAL OFFICES:
Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works: Ambridge, Pa., Chicago, Ill., Newark, N.J., Putnam, Conn.

WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¼" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

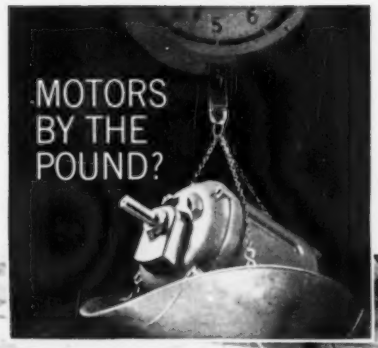
threaded parts at lower costs. In operation, the automatic threader goes through the same threading motions as the manual unit it replaces. It operates on the same time-proven principle of using a lead screw mounted directly on the headstock spindle and a mating follower. There are no intervening gears. Therefore, nothing interferes with accurate duplication of the precision lead screw. (Hardinge Brothers, Inc.)



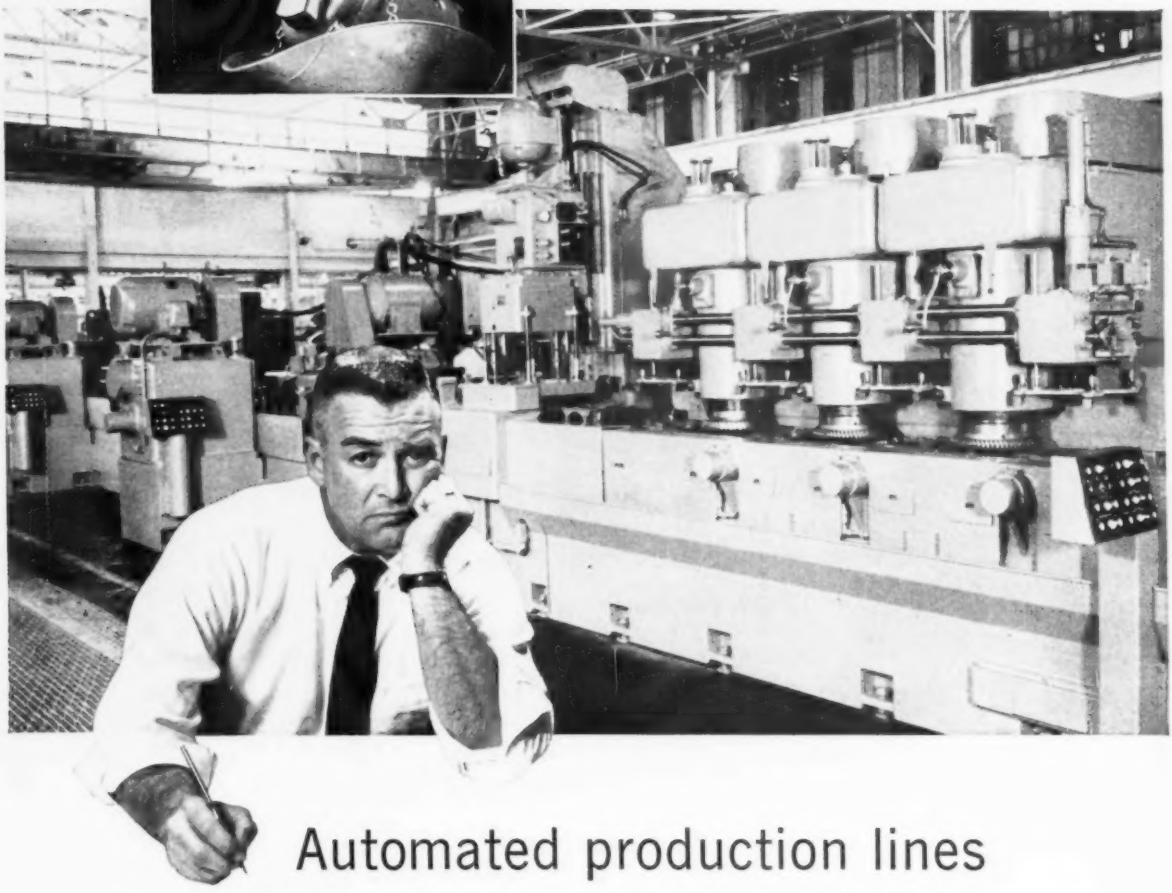
For more data circle No. 56 on postcard, p. 127

Crane Lifts 25,000 lb

This new 25,000-lb capacity, all-hydraulic crane features a 360° rotating, telescoping boom. Line speed is a fast 200 fpm with a single-part line, and 50 fpm with a four-part line. The boom can be hydraulically extended from 15-25 ft. The full 25,000 lb capacity is maintained at a 10-ft radius. But it can be increased out to 14 ft directly over the front. A four-outlet swivel valve provides an extra valve for attaching a hydraulically-operated clamshell, grapple or hook at the boom point. A foot controlled slewing mechanism frees the operator's



You're buying motors by the pound when price is the only consideration



Automated production lines multiply the cost of motor failure

Automated production lines can't afford motor drives selected on the basis of price alone. For when a group of machines are linked in series, with each dependent on the preceding machine to supply it, a motor failure in the line quickly multiplies the cost of downtime.

Wagner® totally-enclosed, fan-cooled Type EP and JP motors are perfect power packages for automated lines. They are completely protected against dust, abrasives, fumes, steel chips, or filings. Both ends of these motors have running shaft seals to keep their heavy-duty bearings clean. These Wagner motors will keep your production rates up, delivering full rated horsepower under the toughest conditions . . . staying on the job with continuous service. They have earned their reputation for proven dependability.

Next time you buy motors, check beyond the purchase price. Make sure that you get all the performance you need—with motors that will do the job.

Wagner motors have been getting the job done for more than 65 years. Your Wagner Sales Engineer will be glad to show you why. Call him for an analysis of your next motor application, be it for plant or product.

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WM61-7

IF YOU BUY WASHERS
(and doubtless you do)
THIS CATALOG
IS FOR YOU!

75TH ANNIVERSARY
MILWAUKEE WROT WASHERS

CATALOG 75

75th Anniversary Catalog
of
MILWAUKEE WROT WASHERS
and STAMPINGS

WROUGHT WASHER MFG. CO.
MILWAUKEE 7, WISCONSIN
World's Largest Producers of Washers

75TH ANNIVERSARY
MILWAUKEE WROT WASHERS

Milwaukee Wrought Washer marks its Diamond Anniversary with a useful new Catalog . . . showing the world's most complete washer line

Catalog 75 is a big, handsome, practical manual of useful information on *Milwaukee Wrot Washers and Stampings.* Everyone who buys or specifies washers and stampings should have a copy . . . your sources library is incomplete without it.

Besides giving complete technical information on all types and sizes of washers we manufacture, it contains a 28-page Tool List and a handy Decimal Equivalent Chart, plus a quick-finder Index.

Milwaukee Wrought Washer is the world's largest producer — washers from 1/16 to 23 inches in diameter, .004 to 1 inch in thickness, made of every conceivable material in every conceivable finish. Our over *131,000* sets of washer dies enable us to produce a practically unlimited range of sizes, shapes and varieties.

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. . . please request on your letterhead

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WORLD'S LARGEST PRODUCER OF WASHERS

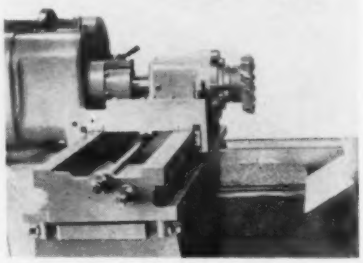
NEW EQUIPMENT

hands for other operations. However, slewing can also be controlled by a hand control. (Pettibone Mulliken Corp.)

For more data circle No. 57 on postcard, p. 127

Compact Miller

Minimum spindle overhang on this new, compact milling machine means maximum transmission of power with stress, vibration and chatter reduced to a minimum. This design permits high feed rates, fast cuts and accurate work. Designed to work efficiently in a production capacity, or in job-shop operation, the mill features a helicone transmission which assures a smooth, efficient flow of power. Its convenient drive arrangement places



the motor behind the column and alongside the bed, where it is free from chips and dust generated at the cutting tools. (G. A. Gray Co.)

For more data circle No. 58 on postcard, p. 127

Low-Cost Stud Welder

According to the manufacturer, this new automatic unit is the lowest-priced stud welder available today. Designed without pushbuttons or triggers, the gun is truly automatic with self-starting circuits. All the operator has to do is press the stud against the work. Welds are automatically timed since the gun shuts itself off when the weld is completed. One advantage of this simplicity is that an operator needs no prior welding experience. The stud welding gun can be operated by anyone. Models are available for either 110 or 220 v. The gun comes complete with both stud and spot welding tips. The complete power pack measures just 8½ x 12 x 12½ in. (Bren/Weld Corp.)

For more data circle No. 59 on postcard, p. 127

DESIGNED FOR THE AIR TRAVELER

Birmingham AIRPORT MOTEL
DIRECTLY FACING BIRMINGHAM AIRPORT

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• 120 Rooms, **DOUBLE SOUND-PROOFED,** Central Air Conditioning and Heating, TV and Hi-Fi radio. • **NO BAGGAGE WORRIES** . . . Step off the plane and into your motel room. • The **AERONAUT RESTAURANT** for your dining pleasure. • The **MEN'S GRILLE** for business luncheon or "quick snack" before your flight — Cocktails in the **FLIGHT LOUNGE.** • Meeting rooms for groups from 10 to 300. • Free Parking for motel guests.

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MIAMI INTERNATIONAL AIRPORT HOTEL
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MIAMI 59, FLORIDA

WE BIN TURNIN' OUT SCREW MACHINE "SPECIALS" FOR 63 YEARS STRAIGHT

MUST BE GOOD HUH!

LIKE OUR "STANDARDS" WHICH ALL GOOD INDUSTRIAL DISTRIBUTORS STOCK

Wm. H. Ottemiller Co.
YORK, PENNSYLVANIA

WRITE FOR BROCHURE

HAYWARD ELECTRIC MOTOR BUCKETS

Work Longer, Work Faster, Wear Less!

Hook onto any electric over-head crane . . . need no latches, hand lines, ropes or limit switches . . . can't discharge accidentally while being traversed . . . operates without need of circuit breakers . . . motor enclosed against dust, soot and weather . . . steel and bronze construction . . . can operate in pits or high-sided cars . . . *plus many other cost-cutting design features!*

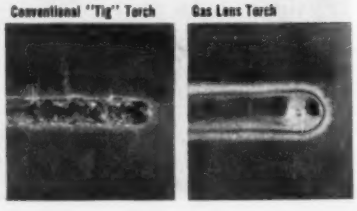
Write for illustrated bulletin giving complete details including sizes, weights and dimensions.

THE HAYWARD COMPANY
50 CHURCH ST., DEP'T I, NEW YORK 7, N. Y.
Builders of Better Buckets Since 1888

LINDE ELECTRIC WELDING

Conventional "Tig" Torch | Gas Lens Torch

WELD SHIELDING ON ALUMINUM 3/4-IN. NOZZLE ELEVATION. 25 CFH ARGON FLOW:



HELIARC

NEW...GAS LENS 'FOCUSING' GIVES COMPLETE SHIELDING

Problem: Quality HELIARC welding requires an *air-proof* weld zone. Conventional "tig" torches create a gas shielding pattern with a cup around the electrode. But gas turbulence makes the patterns ineffective except at short distances . . .

Solution: LINDE's HELIARC Gas Lens—a permeable barrier of concentric, fine-mesh, stainless steel screens. Sharply reduces turbulence . . . projects an *effective* gas pattern over *greater* distances.

Major advantages:

- Better Shielding—Gas Lens "focuses" the gas stream. Torch can be held farther from work. Draft resistance is improved.
- Accessibility, Visibility—long-distance shielding permits electrode extension up to 3/4 in. beyond cup. Makes hard-to-reach places accessible. Eliminates "blind spots."
- Maintenance-Free, Low-Cost—no glass cups to break or discolor. Cuts electrode stub-end loss. Price: $10.

For full details, contact your local LINDE office or write direct.

LINDE COMPANY
Division of Union Carbide Corporation
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UNION CARBIDE

Porcelain Competes

New steels are born at Armco

Enamel "Direct-On" Armco UNIVIT with Paint in Cost

Porcelain Enameled Steel

Cash in on public acceptance of steel; use this mark on your products

In high-volume production, one-coat, one-fire porcelain enamel on new Armco UNIVIT® has proved cost-competitive with top organic finishes. In finish quality, it is far superior.

Porcelain enamel finishes have *extra* sales appeal. They're color-fast, smooth and durable, with exceptional resistance to mechanical damage because of the ultra-thin porcelain enamel coatings that are possible with Armco UNIVIT.

UNIVIT's companion grade, for top-quality two-coat porcelain enameling, is Armco Enameling Iron, called the "World's Standard."

These superior base metals meet a wide range of needs for products and parts, because they are made *specifically* for porcelain enameling. **Armco Division, Armco Steel Corporation, 2111 Curtis Street, Middletown, Ohio.**

ARMCO **Armco Division**

Brushed Nickel-Chrome Plating... for lasting satin beauty at a practical cost

Notice how the brushed Nickel-Chrome finish on the range top and burner controls of this handsome Sunray range gives it a rich, quality look.

Today's high-fashion tastes are attracted by the subtle charm of this satin finish. Women like the way it blends in with any decor, keeps its glowing good looks for years. Besides being easy to clean, brushed Nickel-Chrome Plating resists abrasion and wear, shrugs off the nicks and scratches of everyday use, gives excellent corrosion protection.

Virtually any major appliance or decorative component can have a fashionable, quality look with brushed Nickel-Chrome Plating. And if you want bright trim, selective buffing will give you brightwork effects without the use of trim hardware.

One more reason why you should specify this remarkable finish: brushed Nickel-Chrome Plating can be applied to all the easy-to-fabricate metals—steel, zinc, aluminum, copper, brass. Less common metals can also be readily plated.

For more information on decorative plating systems, write for the booklet, "The Present Status of Decorative Nickel-Chromium Coatings." A copy is yours for the asking.

THE INTERNATIONAL NICKEL COMPANY, INC.

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INCO NICKEL
MAKES PLATING PERFORM BETTER LONGER

Steel Order Pace Like 1959

The rate of new orders reminds sales offices of the pre-strike period of 1959.

Current push is concentrated in flat-rolled products used by consumer industries.

■ Steel ordering has reached the fever pitch with some mills receiving orders at a rate that approaches 100 pct of operating capacity.

As a result, backlogs are building up, lead times are lengthening, and, for some products, quotas for the first quarter of 1962 are already a fact of life.

Like 1959—The run on sales offices is as strong as it was in 1959. Then, like today, consumers were in the midst of a big inventory build-up as a hedge against a possible steel strike.

The current buildup is concentrated at the moment in the consumer industries. This means an emphasis on flat-rolled products, principally cold-rolled sheet, tinplate, enameling sheet, and others.

The buildup was first centered in the auto industry, which several weeks ago indicated it would begin a buildup of steel stocks through June. Appliance makers have followed along and canmakers are also in with surprisingly big orders for tinplate.

Heavy Steel Slower—The heavy industries, such as machinery and contractors, must order specific products for individual projects. This means they can not build inventories too far in advance of anticipated new business. This has tended to delay ordering of heavy steels.

But it does not mean that these users intend to let their ultimate steel stocks lag, although it has delayed their entry into the buying race. When they do come into the market, it will strengthen ordering on a broad base.

Mills anticipate this surge from general users. One result is growing competition within the mills as finishing departments compete for first half ingots.

Inventories Gone — The recent upsurge in new business for December has wiped out inventories of semi-finished steel at some mills. In anticipation of the year-end surge, and also because fall steel consumption was less than expected, mills had built up stocks of semi-finished steel. Now, much of this is wiped out well before the first of the year.

While the general market has lagged behind the consumer goods makers, general orders have picked up, too. Orders for plate and structurals have moved up. Bar mills are also stepping up production to meet new orders. Warehouses have come into the market to build up their own stocks.

December Strong—December now looks to be a very good month. Many big users have advanced January tonnage into December, even at the price of paying inventory taxes.

In the auto industry, December production schedules have been increased to meet a strong demand for new cars. One major automaker has told suppliers to ship all the January tonnage they can after Dec. 15.

It all adds up to a tremendous first half scramble for steel tonnage.

District Steel Production Indexes
1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	113	107	102	73
Buffalo	113	102	97	62
Pittsburgh	105	103	103	71
Youngstown	98	94	100	64
Cleveland	121	105	115	74
Detroit	158	155	147	91
Chicago	126	119	112	79
Cincinnati	135	133	138	79
St. Louis	122	135	125	79
Southern	105	103	103	70
Western	108	108	110	85
U. S. Index	115.8	111.3	109.8	74.5

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	2,016	2,073	91,011	94,060
Ingot Index				
(1957-59=100)	115.8	111.3	99.8	103.6
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$34.50	$34.17	$34.50	$28.50
No. 2 bundles	$24.17	$23.83	$24.17	$18.50

Press Buyer in Good Position

Delivery and availability are good. Prices are reasonable at present.

But forces in the market could trigger some fast-paced explosions and change the picture.

■ After sharp gains in the second quarter of this year, the press industry slipped back in the third quarter and deliveries have been shortening since.

For the press buyer who is looking at the period immediately ahead, there doesn't seem a strong likelihood that delivery times will extend appreciably over the next two quarters. This is the opinion of a number of press builders.

Current Pricing—Industry backlogs are reported relatively low, with four months a frequently quoted figure. Off-the-shelf press and press brake models are offered for immediate delivery. Even heavy specials, reports one source, reflect little more than engineering time in the delivery promises being offered. If there's no hurry to avoid longer deliveries, however, the buyer will certainly find current pricing a good buy.

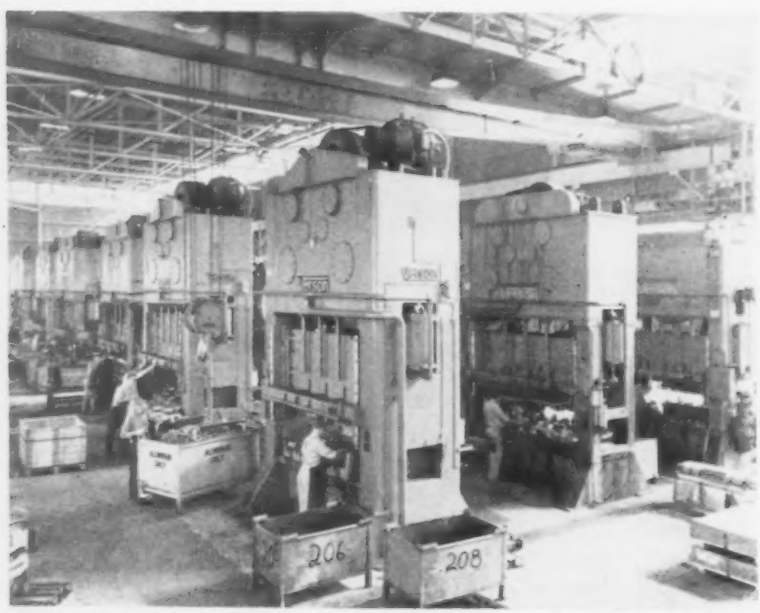
After the mild September and early October gain, which had some purchasing men beginning to watch the press market closely for evidence of advancing prices and longer deliveries, press activity slackened. There are no immediate indications of a sharp recovery for at least several months.

Available Equipment — Light model, off-the-shelf equipment is readily available, though level of sales of this equipment, press men report, has been relatively higher than have "specials." A few reports suggest that there has been a slight quickening in the inquiry rate over the past two weeks, and at least a few manufacturers have been able to point to "spotty" sales gains. This is not expected to allow any upward price movement for the near future, and certainly no lead-time stretchout. Indicative of the sharply divided opinion on the near-term: While at least two producers were able to spot mild gains in the past two weeks, they were immediately countered by one producer who spotted a slide in sales that's about two weeks old and centered in what had been his best selling area, light equipment. And a second reports that his backlog is still declining.

Auto Push—In the background: The possibility that both auto and defense manufacturers might begin to move. Automotive is described as having been on a minimum press diet, despite the fact that the industry is now beginning to talk of a banner selling year in 1962. Similarly, despite the expected sharp upswing in all types of defense manufacturing late next spring, there's been little activity in press sales that can be attributed to it.

The purchasing agent, who must balance dollars against convenience, has pretty good authority for expecting no major changes in press activity in the next three to four months. But he will need to watch the auto picture closely. It's conceded, even by pessimists, that there are some major press needs building up. Purchasing men will have to assume that a continuing high level of sales in the auto industry could trigger some important buying programs.

Buyers Beware—At the moment, there's not much feeling among pressmakers themselves that this, or a defense splurge, is going to happen. Delivery is excellent, prices favorable to the buyer. One cautious note: Just three weeks ago, there were steel men who were predicting little inventory buildup in the near future. Presses could bear watching.



PRESS PERFORMANCE: Makers are not yet feeling defense money.

Wire Rope Manufacturers: Save $99,400 Per Year!

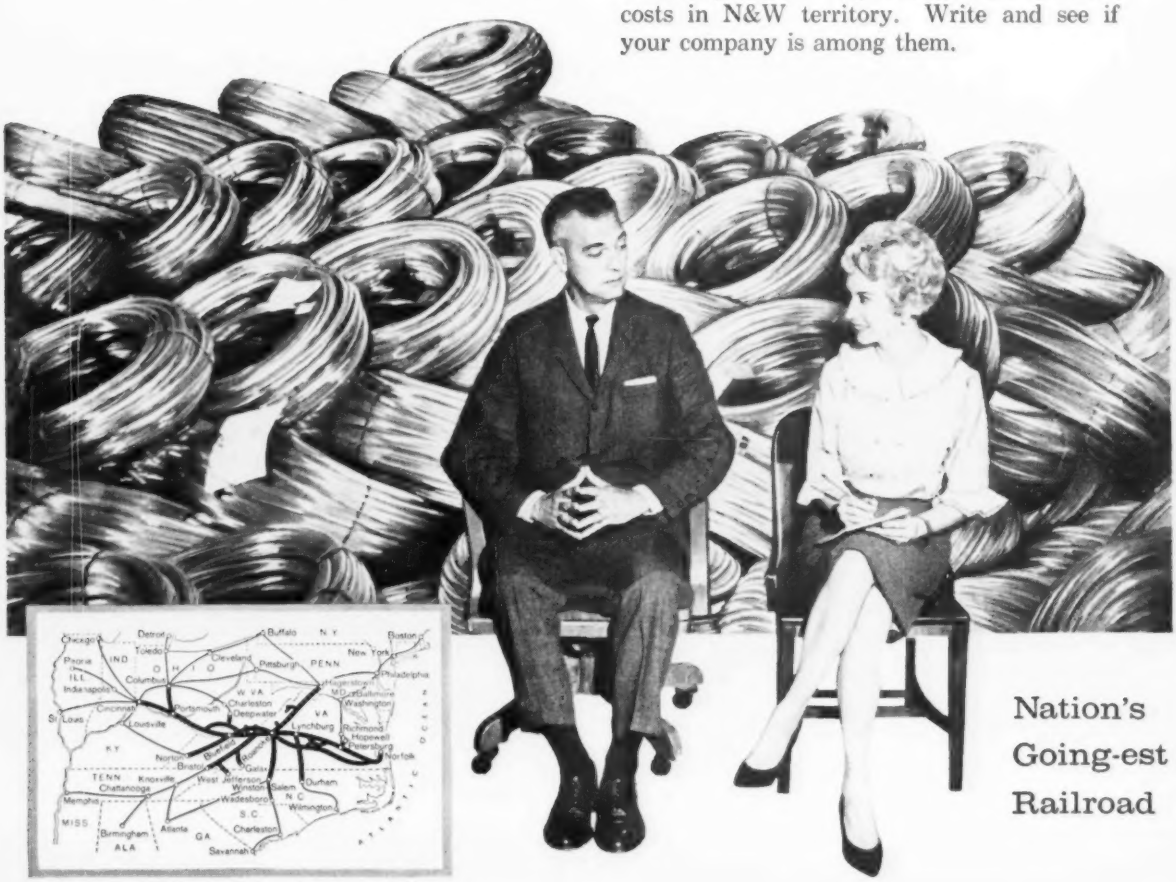
A comprehensive study of N&W territory, by Fantus Area Research, revealed ideal sites for wire rope plants. Estimated operating costs at these sites were compared with actual operating costs of wire rope plants around the nation. Result: at the N&W sites a wire rope plant can save $99,400 a year. Want details? Write on company letterhead to H. P. Cotton, Assistant Vice President, Norfolk & Western Railway, Roanoke, Va.

N&W

NORFOLK and WESTERN RAILWAY

GENERAL OFFICES • ROANOKE, VA.

Many Other Types of Plants can cut costs in N&W territory. Write and see if your company is among them.



Nation's Going-est Railroad

Demand Snowballs For Flat-Rolled

Other industries begin following automotive's lead of strike-hedge buying.

In some areas, specialties such as galvanized are already on quota for the first quarter.

■ The market showed signs of a definite uptrend this week, with demand for flat-rolled products leading the way.

Orders continue to come in strong from the auto producers.

They are now being joined by orders from other mass-production industries. These have changed their plans about waiting until early next year to build their inventories as a strike hedge. Many are now moving their tonnages for January into December.

The inventory buildup is biting heavily into mills' stocks of hot-rolled, cold-rolled, galvanized, terneplate, and enameling stock. But so far, strict quotas have been limited to specialties such as galvanized, electro-galvanized, and electrical sheets and tubing. But they are only a matter of time for other products.

Tinplate is also picking up. The can companies are following their 1959 strike buildup and are ordering tinplate into June.

Demand for stainless in Pittsburgh has firmed generally. Automotive buying programs have brought a definite increase in lead times and volume for strip. Deliveries are lengthening a little but the mills will still give rush service on big orders. In the Chicago area service centers, however, stainless remains weak. The volume has improved but prices continue soft.

There are also some new ideas about how to build up inventory. Some auto makers and their suppliers are trying to separate the tonnage they are stockpiling. They apparently want to keep a check on how much is in and, in the event of a strike, how it's used.

Then there's the possibility of foreign buying. A 2500-tons-a-month customer of one East Coast mill considered getting 2000 tons a month from overseas after next July. It's sold on the domestic mills now, but the cost of inventory building and the lure of foreign mills is enticing.

Sheet and Strip — In **Pittsburgh,** cold-rolled sheet continues to be the strongest steel product. Hot-rolled is not quite as strong. Order rates have risen sharply after a sudden push from consumer goods industries. In **Cleveland,** many users are moving January tonnage into December, despite year-end inventory taxes. Some interpret this as a business upturn sign, rather than strike-hedge buying. Galvanized is the tightest product here, with terneplate pretty much on quota for the first half. The December output of cold-rolled sheets in **northeast Ohio** is expected to be 10 pct above November's.

PURCHASING AGENT'S CHECKLIST

Electric power's expansion means big metalworking markets. p. 81

New gage speeds checkout tests in metalworking. p. 101

Tin mills brace for order rush from canmakers. p. 86

In the **Midwest,** deliveries on all flat-rolled items have extended four weeks or more and cold-rolled sheet has extended to six weeks. Warehouses are scrapping some of their cautious buying plans and are now scrambling for sheet along with the auto builders. The appliance makers are also getting into the act and are putting heavy pressure on sheet and enameling stock. In **Detroit,** orders for flat-rolled products continue to pour in from auto sources. One mill is even taking parts of mill quotas which were allotted to its offices in other cities.

Bar—Bar users are talking more about forward buying than doing it. But December orders in **Cleveland** are about 10 pct ahead of November and some users are moving January tonnage into December. In the **Midwest,** some mills continue to offer 30-day delivery, but some consumers say it's running closer to 45 days. In **Pittsburgh,** December looks about the same as November for carbon bars. January is running slightly ahead of December and is expected to move up 10 to 15 pct when final commitments are made. One producer sees the upturn following the 1959 pattern.

Tinplate—Strike hedge buying is growing stronger. In the **Midwest,** tinplate is sold out through January at most mills. In **Cleveland,** can companies are ordering tinplate into June. They seem to be following their pre-1959 strike build-up when they began ordering ahead as early at November, 1958.

They still remember 1952's strike, for which they didn't load up.

In **Pittsburgh,** canmakers indicate they will be taking eight months' supply during the first six months of 1962. Formal orders have not yet been placed by the biggest companies. But the inventory pattern appears definite.

Plates and Shapes—Orders have picked up in **Pittsburgh,** where producers think they see the first signs of inventory buying. One mill says December looks better than November and January better than December.

COMPARISON OF PRICES

(Effective December 11, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Dec. 11 1961	Dec. 4 1961	Nov. 13 1961	Dec. 13 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	49.50	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.49¢	6.49¢	6.49¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Dec. 11 1961	Dec. 4 1961	Nov. 13 1961	Dec. 13 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.11
Foundry, South Conn.	71.92	71.92	71.92	71.92
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd. Philadelphia	70.11	70.11	70.11	69.61
Basic Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. Cents per lb‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig Iron	$66.44	$66.44	$66.44	$66.32
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$35.50	$35.50*	$33.50	$26.50
No. 1 steel, Phila. area	33.50	33.50	33.50	33.50
No. 1 steel, Chicago	34.50	33.50*	31.50	25.50
No. 1 bundles, Detroit	31.50	30.50*	29.50	21.50
Low phos., Youngstown	37.50	37.50*	37.50	28.50
No. 1 mach'y cast., Pittsburgh	44.50	44.50	44.50*	44.50
No. 1 mach'y cast., Phila.	47.50	47.50	47.50	47.50
No. 1 mach'y cast., Chicago	46.50	45.50*	44.50	41.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$34.50	$34.17*	$32.83	$28.50
No. 2 bundles	24.17	23.83*	23.50*	18.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper electrolytic, Conn.	$31.00	$31.00	$31.00	$30.00
Copper Lake, Conn.	31.00	31.00	31.00	30.00
Tin, Straits, N. Y.	121.50†	122.125	123.50	101.875
Zinc, East St. Louis	12.00	12.00*	11.50	13.00
Lead, St. Louis	10.05	10.05*	9.80*	11.80
Aluminum, ingot	24.00	24.00	24.00	26.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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*Appears in the Dec. 7-Dec. 21 issues.

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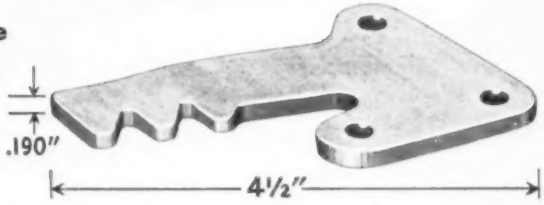

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Market Reveals New Strength

Continued and growing stability is seen in scrap markets across the country.

Chicago showed definite gains with price increases in most grades. Other areas report definite firmness.

■ Scrap market strength continues to grow across the nation. Firmness is felt in most areas. But Chicago is the only center where it took the definite form of price increases in prime steelmaking grades.

This third week of stability is reassuring to scrap dealers. But they still await a general upturn. Some feel it could come this month. But most look for a business surge in January, with pressure building toward higher prices.

No. 1 steelmaking grades went up $1 in Chicago. It's the third straight week of price increases in this area.

East Coast dealers aren't looking for export to firm up their markets soon. Japanese buyers have pushed back their orders another month. Export impetus on the general market probably won't be felt until mid-January, or later.

In most areas, anticipation of increased activity has tightened scrap supply. But timing of the new orders is still uncertain.

On the basis of price changes in Chicago, The Iron Age composite price for No. 1 heavy melting advanced to $34.50 from $34.17. No. 2 bundles composite price rose to $24.17 from $23.83.

Pittsburgh—Consumer buying is still light here. But most signs point to future strength. On a late list, railroad specialties went for $2 over last month. No. 1 railroad heavy melting was up slightly on this list. It was believed that at least part of the tonnage was bought for domestic sale. In the dealer market, turnings prices are up on the basis of higher quotations for unprepared material. There has been no change in the price being offered by the only local consumer of No. 2 bundles.

Chicago—Despite mill resistance, broker buying prices continued to advance this week. Spot purchases by consumers confirm the growing market strength. New purchases averaged about $1 higher, though dealer asking prices seem to be stiffening at a faster rate. With additional automotive bundle lists expected at the end of this week, it's felt their prices will exceed the $1 consumer price advance.

Philadelphia—The market is definitely firmer here. Larger mill orders are starting to trickle in, but it's easier for dealers to sell than buy at current low prices. There seems little question now that the low point was reached two weeks ago.

New York—The market remains quiet. Some sources are optimistic about price changes in the first quarter of 1962. Consensus is the market is marking time, having bottomed out.

Detroit — Beneath the surface, there's growing strength. But there is something of a standoff in buying and selling because of a feeling that prices will keep increasing. There probably will be a rise in the level of dealer operations next month. Local mills give evidence of running at a high rate of capacity in January.

Cleveland—The market has taken a bullish turn. But is must still absorb heavy production lists. So dealers haven't felt much impact yet. No. 2 bundles jumped $3 on broker covering of old orders for a local mill. New orders would go still higher. Dealers are stocking up for a rush and selling with reluctance.

Cincinnati — Market is still optimistic. But it is concentrating on routine shipments of monthly orders. Dealers will sell only small tonnages and nobody wants it bad enough so far to affect the prices.

St. Louis—Market is strong here and a definite upturn is expected in January. Dealers are not anxious to sell. They seem to be sitting back, waiting for mills to raise prices. Mills are willing to buy at present prices. But little scrap is moving.

Birmingham — Scrap buying showed an unexpected pickup this week. Consumers who said they would be out of the market for the rest of the year suddenly began buying small amounts. A large cast iron pipe manufacturer raised its price $2 per ton in purchasing No. 1 cast and stove plate.

Buffalo — Prices remain unchanged. But the market is perking up. Outside markets show growing strength, which should affect local prices.

Boston — No price changes this week. The market is still slow, but signs of firmness are appearing.

Houston — Domestic market is quiet. But there is a flurry of export activity. Exporters are quoting $1 to $2 a ton above domestic prices for prime steelmaking grades.

West Coast—On appraisal, prices moved up $1. One mill bought a substantial tonnage in Los Angeles. Dealers don't look for real improvement, however, until the Japanese start buying again.

SCRAP PRICES *(Effective December 11, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy melting	28.00 to 29.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs plate	42.00 to 43.00
Heavy turnings	29.00 to 30.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	44.00 to 45.00
Rails 2 ft and under	49.00 to 50.00
RR specialties	47.00 to 48.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	80.00 to 85.00
410 turnings	50.00 to 55.00

Chicago

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	35.00 to 36.00
No. 1 factory bundles	37.00 to 38.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	19.00 to 20.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. forge crops	45.00 to 46.00
Low phos. punch'gs plate, ½ in. and heavier	45.00 to 46.00
Low phos. 2 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	44.00 to 45.00
Rerolling rails	57.00 to 59.00
Rails 2 ft and under	50.00 to 51.00
Angles and splice bars	43.00 to 44.00
RR steel car axles	56.00 to 57.00
RR couplers and knuckles	43.00 to 44.00
No. 1 machinery cast.	46.00 to 47.00
Cupola cast.	40.00 to 41.00
Cast iron wheels	35.00 to 36.00
Malleable	45.00 to 46.00
Stove plate	34.00 to 35.00
Steel car wheels	41.00 to 42.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	95.00 to 100.00
430 turnings	60.00 to 65.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	10.00 to 11.00
Mixed bor. short turn.	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	27.00 to 28.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	36.00 to 37.00
Heavy turnings	27.00 to 28.00
RR specialties	40.00 to 41.00
Rails, 18 in. and under	48.00 to 49.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	40.00 to 41.00
Malleable	47.00 to 48.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.50 to $33.50
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	33.50 to 34.50
No. 2 bundles	18.00 to 19.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos. 18 in. and under	41.00 to 42.00
Rails, random length	41.00 to 42.00
Rails, 18 in. and under	48.00 to 49.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	29.00 to 30.00
Drop broken cast.	42.00 to 43.00

Youngstown

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	37.00 to 38.00

Cleveland

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	33.00 to 34.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	33.00 to 34.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	39.00 to 40.00
Low phos. punch'gs plate	34.00 to 35.00
Drop forge flashings	33.00 to 34.00
Foundry steel, 2 ft & under	34.50 to 35.50
No. 1 RR hvy. melting	38.00 to 39.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	50.00 to 51.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	44.00 to 45.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	37.00 to 38.00
Malleable	48.00 to 49.00
Stainless	
18-8 bundles	160.00 to 165.00
18-8 turnings	95.00 to 100.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 busheling	27.00 to 28.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Low phos. plate	33.00 to 34.00
Structural and plate, 2 ft and under	35.00 to 36.00
Rails 2 ft and under	46.00 to 47.00
Scrap rails, random lgth.	36.00 to 37.00
No. 1 machinery cast.	43.00 to 44.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	27.00 to 28.00
Foundry steel, 2 ft.	29.00 to 30.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	15.50 to 16.50
Shoveling turnings	17.50 to 18.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	35.00 to 36.00
Rails random lengths	39.00 to 40.00
Rails, 18 in. and under	43.00 to 44.00
RR specialties	39.00 to 40.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	31.00 to 32.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	53.00 to 54.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	34.00 to 35.00
Bar crops and plate	42.00 to 43.00
Structural and plate, 2 ft.	41.00 to 42.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	44.00 to 46.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	40.00 to 41.00
Stove plate	40.00 to 41.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	30.00 to 31.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	15.00 to 16.00
Mixed bor. and turn.	5.00 to 6.00
Machine shop turnings	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	150.00 to 155.00
18-8 turnings	75.00 to 80.00
430 prepared solids	55.00 to 60.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	28.00 to 29.00
Drop forge flashings	27.00 to 28.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	31.00 to 32.00
Automotive cast.	41.00 to 42.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	75.00 to 80.00
430 bundles and solids	65.00 to 70.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	24.00 to 25.00
Machine shop turn.	3.00 to 4.00
Shoveling turnings	8.00 to 9.00
Clean cast. chem. borings	15.50 to 16.50
No. 1 machinery cast.	38.00 to 39.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	27.00 to 28.00

San Francisco

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	21.00 to 22.00
No. 2 bundles	19.00
Machine shop turn.	12.00
Cast iron borings	12.00
No. 1 cupola cast.	44.00 to 45.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	27.00
No. 1 dealer bundles	22.00
No. 2 bundles	19.00
Machine shop turn.	12.00
Shoveling turnings	12.00
Cast iron borings	12.00
Elec. furnace 1 ft and under (foundry)	42.00
No. 1 cupola cast.	42.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	26.00 to 27.00
No. 2 bundles	18.00 to 19.00
No. 1 cupola cast.	34.00
Mixed yard cast.	29.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$27.00
No. 2 hvy. melting cut 3 ft and under	23.00
No. 1 dealer bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Bush., new fact., prep'd.	27.00
Bush., new fact., unprep'd.	22.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	30.00
No. 2 bundles	21.00
Machine shop turn.	12.00
Shoveling turnings	15.00
Cut structural plate 2 ft & under	$42.00 to 43.00
Unstripped motor blocks	28.00 to 29.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	28.00 to 29.00

Improved Aluminum Process Pushed

Lower-cost and improved production methods have long been the aim of aluminum makers.

Newest advance is a reduction cell using refractory hard metals, developed by Kaiser Aluminum & Chemical Corp and British Aluminium Co. Ltd.

▪ Aluminum makers keep driving for improved, lower-cost methods of production.

The newest development—jointly announced by Kaiser Aluminum & Chemical Corp. and British Aluminium Co., Ltd.—is a reduction cell using refractory hard metals.

Steady Push—While significant, it's only another move in the continuing push to improve aluminum production methods. Other advances were announced earlier by Aluminium, Ltd. and by Pechiney and Ugine, major French aluminum producers. Both these methods aim at bypassing the electrolytic reduction process.

Basically, the method announced by Kaiser last week substitutes refractory hard metals (dense, heat-resisting metal alloys), for present cell linings.

This, Kaiser points out, can lead to an improvement of up to 15 pct in cell operation. It's important because this could be achieved in two ways: A decrease in the energy consumed per pound of metal produced. An increase in metal output per reduction cell.

In addition, the new processing method permits expansion of capacity at existing plants with relatively small capital expense.

Joint Effort — The development was invented by research experts of British Aluminium in the early 1950's. Kaiser then joined BA in the mid-1950's in a research program to further develop the basic inventions.

Most interesting is the fact that both BA and Kaiser are now using the development in some of their reduction facilities. However, they give no details on locations. And they plan to make refinements "to existing cells to insure successful adaption of the method to all types of reduction cells."

In contrast, Aluminium Ltd. hopes to have a pilot plant for its new aluminum-making process in operation at Arvida, Canada, sometime next year. Pechiney and Ugine are further along with a small production plant in operation.

While technical details are scant on both these operations the aim is to bypass the step of first converting ore to alumina. Apparently, high temperatures, pressures, and a gaseous halide are used, followed by decomposition to extract aluminum.

What It Means—What do all the new developments mean to the aluminum market?

The new processes should mean a long-range cost improvement for producers. Profit margins could be enlarged. And this might be applied to marketing in an effort to improve and enlarge markets.

Conventional potlines won't be eliminated at existing plants. Obviously the new processes won't make existing potlines obsolete overnight. This is especially true where these plants are being substantially depreciated or amortized. But as new equipment is built it will incorporate the advances.

Extrusion Prices Shaved

Kaiser Aluminum & Chemical Corp. led the move last week to lower aluminum extrusion ingot prices by 1.2¢ per lb. Other producers including Aluminum Co. of America and Reynolds Metals Co. took similar action.

The reduction allows extruders to purchase ingot or billet at 24.30¢ if they return no scrap when buying. In addition, there is a direct reduction of .2¢ per lb for extrusion ingot.

Price cuts for extrusions follow a 2¢ per lb reduction in ingot prices made by aluminum producers in late September.

Tin Prices for the Week

Dec. 5—122.25; Dec. 6—122.00; Dec. 7—121.75; Dec. 8—121.375; Dec. 11—121.50*

*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in NOVEMBER based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	31.00
Copper, Lake	31.00
Straits, Tin, New York	123.04
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.01
Aluminum Ingot	24.00

Note: Quotations are on going prices.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	24.00	26.00	9/25/61
Copper (E)	31.00	38.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.05	9.80	11/30/61
Lead, N. Y.	10.25	10.00	11/30/61
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	12.00	11.50	11/30/61
Zinc, N. Y.	12.50	12.00	11/30/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 163.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)
("F" temper except 6061-0)

Alloy	.030-.037	.047-.060	.076-.096	.154-.250
1100, 3003	47.4	46.4	45.4	44.4
5052	54.8	52.0	49.8	46.8
6061-0	53.0	50.3	48.4	47.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size*	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated
(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade		67.9	69.0	77.9	103.1
AZ31B Spec.		93.3	96.9	108.7	171.2
Tread Plate		70.6	71.7		
Tooling Plate	73.0				

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.3

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	147	126	145
Strip, CR	133	114	145
Rod, bar, HR	116	95	116
Angles, HR	116	95	116
Plates, HR	139	116	133
Shot, blocks	...	93	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Rod	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Munts Metal	51.94	.....	47.25	.....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	.....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod 34.77

TITANIUM

(Base 30,000 lb, f.o.b. customer's plant)

Sheet and strip, commercially pure, $6.00-$15.00; alloy, $13.40-$17. Plate HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged commercially pure, $3.60-$4.00; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be ..... $ 5.00
Beryllium copper, per lb conta'd Be $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb) ... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95¢ to 36.95¢
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9% dollars per troy oz. $ 2.25
Iridium, dollars per troy oz. .... $70 to $75
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury dollars per 76-lb flask f.o.b. New York ..... $188 to $191
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel 77.50
Palladium, dollars per troy oz. $24 to $26
Platinum, dollars per troy oz. ... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 102.75
Thorium, per kg $43.00
Vanadium ..... $ 3.45
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 32.00
No. 120 ..... 31.25
No. 123 ..... 30.50
80-10-10 ingot
No. 305 ..... 36.00
No. 315 ..... 33.75
88-10-2 ingot
No. 210 ..... 43.75
No. 215 ..... 40.50
No. 245 ..... 35.75
Yellow ingot
No. 405 ..... 27.50
Manganese bronze
No. 421 ..... 31.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95.5 aluminum-silicon alloys
0.30 copper max. 23.25-23.75
0.60 copper max. 23.00-23.50
Piston alloys (No. 132 type) ... 25.00-26.00
No. 12 alum. (No. 2 grade) ... 21.25-21.75
108 alloy 21.75-22.25
195 alloy 24.25-24.75
13 alloy (0.60 copper max.) ... 23.00-23.50
AXS-679 (1 pct zinc) 21.50-22.50

Steel deoxidizing aluminum notch bar granulated or shot
Grade 1—95-97½% 22.75-23.75
Grade 2—92-95% 21.50-22.50
Grade 3—90-92% 20.50-21.50
Grade 4—85-90% 19.50-20.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	
Yellow brass	20 3/8	18 1/2
Red brass	23 7/8	23 1/8
Comm. bronze	24 3/4	24
Mang. bronze	19 1/4	
Free cutting rod ends		18 1/2

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26 3/4
No. 2 copper wire 24 3/4
Light copper 22 1/2
*Refining brass 23 1/2
Copper bearing material 22 1/2
* Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26 3/4
No. 2 copper wire 24 3/4
Light copper 22 1/2
No. 1 composition 24
No. 1 comp. turnings 23 1/2
Hvy. yellow brass solids .... 17 —17 1/2
Heavy yellow brass turnings 16 —16 1/2
Radiators 20
Aluminum
Mixed old cast. ..... 12 —12 1/2
Mixed new clips ..... 14 —14 1/2
Mixed turnings, dry ..... 12 1/2—13 1/2

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 23 —23 1/2
No. 2 copper wire ..... 21 —21 1/2
Light copper ..... 18 3/4—19 1/4
Auto radiators (unsweated) . 16 —16 1/2
No. 1 composition ..... 20 —20 1/2
No. 1 composition turnings.. 19 1/2—20
Cocks and faucets ..... 16 1/2—17
Clean heavy yellow brass ... 14 1/4—14 1/2
Brass pipe ..... 16 1/4—16 3/4
New soft brass clippings .... 17 3/4—18 1/4
No. 1 brass rod turnings .... 15 1/2—16

Aluminum

Alum. pistons and struts .... 6 1/2— 7
Aluminum crankcase ..... 9 — 9 1/2
1100 (2s) aluminum clippings 11 1/4—11 3/4
Old sheet and utensils ..... 9 — 9 1/2
Borings and turnings ..... 4 1/2— 4 3/4
Industrial castings ..... 8 3/4— 9 1/4
2020 (24s) clippings ..... 10 —10 1/2

Zinc

New zinc clippings ..... 5 — 5 1/4
Old zinc ..... 3 — 3 1/4
Zinc routings ..... 1 3/4— 2
Old die cast scrap ..... 1 3/4— 2

Nickel and Monel

Pure nickel clippings ..... 56 —58
Clean nickel turnings 43
Nickel anodes ..... 60 —62
Nickel rod ends ..... 56 —58
New Monel clippings 32
Clean Monel turnings ..... 22 —24
Old sheet Monel 30
Nickel silver clippings, mixed..... 20
Nickel silver turnings, mixed. 16

Lead

Soft scrap lead ..... 6 1/4— 6 1/2
Battery plates (dry) ..... 2 — 2 1/4
Batteries, acid free ..... 1 1/4— 1 1/2

Miscellaneous

Block tin ..... 90 —92
No. 1 pewter ..... 64 —66
Auto babbitt ..... 45 —46
Mixed common babbitt ..... 9 1/2—10
Solder joints ..... 13 3/4—14 1/4
Small foundry type ..... 8 —8 1/2
Monotype ..... 8 1/4— 8 3/4
Lino. and stereotype ..... 7 1/2— 7 3/4
Electrotype ..... 7 — 7 1/4
Hand picked type shells .... 5 1/4— 5 3/4
Lino. and stereo. dross ..... 1 — 1 1/2
Electro dross ..... 1 3/4— 2 1/4

(Effective Dec. 11, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

Electro-galvanized-plus galvanizing extras

(Effective Dec. 11, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Coke▲ 1.25-lb. base box	Electro▲▲ 0.25-lb. base box	Thin 0.25 lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6, S15*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*			Hollowware Enameling 29 ga. 7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3, Y1.*		6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1 Y1,*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$6.65 *G2*	
	Kokomo, Ind.			6.975 C9						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1†† R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

* Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢. †† 7.425 at Sharon; Niles is 7.225.

(Effective Dec. 11, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3, S15*		7.70 *B5*	6.725 *B3,R3, S15*	9.025 *B3,B5, S15*	8.30 *B3*	5.30 *B3*				8.00 *W6, S15*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Conteaville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1, A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Medina, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, W15, B5*		9.025 *A5, C13,W13*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,W13*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.10 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Dec. 11, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.
S15 Seaway Steel Div., Roblin-Seaway Ind., Inc., North Tonawanda, N. Y.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
W13 Western Cold Drawn Steel Div. of Standard Screw Co., Elyria, O.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24				
Baltimore	$.10	9.60	10.36	10.16	11.35	9.70	9.95	9.75	11.80	17.48	16.48	21.58	20.83
Birmingham		9.11	11.00	11.39	10.10	9.06	9.12	8.91	13.14	18.84	16.65	22.94	22.19
Boston**	.10	10.00	10.50	11.87	12.50	9.95	10.60	10.15	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.28	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.33	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37‡	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98				20.84
Detroit**	.15	9.63	10.61	10.65	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35§	10.23	8.20	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35‡	12.15	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.78	10.50	10.95	11.44	9.47	9.82	9.63	12.85	18.59	16.68	22.69	21.04
Milwaukee**	.15	9.51	10.49	10.42	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.34	20.49
New York**	.10	9.91	10.44	11.64	13.67	9.99	10.45	10.15	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20			8.90	8.65	9.20	8.90	10.70				
Philadelphia	.10	9.90	10.10	10.99	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		10.40	12.25	12.35	12.40	10.55	11.00	10.40	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75‡	11.95	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.65	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.65	22.15
St. Louis**	.15	9.57	10.73	10.66	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.63
St. Paul	.15	8.97	9.64	10.79	11.14	8.81	9.32	8.97	11.64		16.69	21.79	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 17"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16"; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13g zinc. ‡ Deduct for country delivery. § 15 ga. & heavier: ‖ 14 ga. & lighter. ‖ 10 ga. x 48 — 120.

(Effective Dec. 11, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	71.00†
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: **Add, 75¢ per ton for each 0.25 pct** silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct; 50c per ton for each 0.25 pct manganese or portion thereof over 1 pct, **add $1.00** for 0.21-0.69 pct phos. Add 50c per gross ton for truck loading charge.

Silvery Iron: Buffaln (6 pct), *H1*, $79.25; Jackson *I1, I4*, Toledo, *I4*, $78.00; Niagara Falls (5.01-5.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75c per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct; up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	Pct
Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	Pct
Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

(Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	42	42

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	46
5/16, ⅜ & ½ in. diam	15,000 pcs	46

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75-21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	26.75	29.25-26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	31.50	35.00-31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	42.25	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	29.75	33.25-29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A5;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A5;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7.* Wallingford, Conn., *U3* (plus further conversion extras†, *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6,* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A5;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A5;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *I4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A5;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¾").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *I4;* Watervliet, N. Y., *A5;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A5,* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1;* Claymont, Del., *P2.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A5;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	42	54
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	52	57
	15,000 pcs	
	52	57

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	11

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Dec. 11, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Annld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dsv. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2*****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	.....	236	9.95	10.50
Sparrows Pt. *B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc at .12¢ a lb. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 12¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.70
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

SHORT ARC

NEW... COMPLETE *SIGMA* SWM-14 OUTFIT AT A LOW PACKAGE PRICE—$1,475

LINDE's all-new SIGMA SWM-14 Short Arc package . . . *all the equipment you need* for welding thin-wall pipe, tubular structural members, all thin-gauge metals—without burnthrough. Short Arc welding uses tiny drops of metal, not a spray. Tolerates 100% gaps. All-position welding with uniform burnoff rate, pinpoint heat control, minimum distortion.

The SWM-14's only "economy" is its price—$1,475. All parts are heavy-duty and readily accessible. *Compare what you get:*

- Compact, detachable wire-feed control unit—with centrifugal governor—swivel-mounted on power supply.
- 200-amp power supply (100% duty cycle) with variable voltage and inductance.
- 14-oz., 200-amp, air-cooled torch for .030-, .035- and .045-in. diameter wires.
- Shielding gas regulator-flowmeter.
- 10 ft. of argon, wire-feed, and power lines.

For complete details . . . and a "live" demonstration . . . contact your local LINDE office or write direct.

LINDE COMPANY
Division of Union Carbide Corporation
270 Park Avenue, New York 17, New York

UNION CARBIDE

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	....	....	....
Cleveland *R3*	....	....	....	....	....	15.35
So. Chicago *R3*	....	....	....	10.10	....	....
Emeiy *T2*	5.75	6.725	....	....	....	....
Fairfield *T2*	....	6.725	....	10.10	6.875	....
Gary *U1*	5.75	....	....	....	6.875	....
Huntington, *C16*	....	6.725	....	....	....	....
Ind. Harbor *I3*	....	....	....	10.10	....	....
Johnstown *B3*	....	6.725	....	....	....	....
Joliet *U1*	....	....	7.25	....	....	....
Kansas City *S2*	....	....	....	10.10	....	15.35
Lackawanna *B3*	5.75	6.725	7.25	....	6.875	....
Lebanon *B3*	....	....	7.25	....	....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	....	....	....	....	....	15.35
Pittsburgh *J3*	....	....	....	10.10	....	....
Seattle *B2*	....	....	....	....	7.025	15.85
Steelton *B3*	5.75	....	7.25	....	6.875	....
Struthers *Y1*	....	....	....	10.10	....	....
Torrance *C7*	....	....	....	....	6.75	....
Williamsport *S5*	....	6.725	....	....	....	....
Youngstown *R3*	....	....	....	10.10	....	....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	9.10	....	....	....	....
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	....	....
Detroit *D1*	9.05	10.50	12.70	15.70	....
Detroit *D2*	9.05	10.50	12.70	....	....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	....	....	12.90	16.10	19.30
Indianapolis *R3*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.10	17.80	....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A5*	9.05	10.40	12.60	15.60	18.55
Sharon Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

- Rolled elliptical, 18 in. or longer, 5000 lb lots 44.50
- Electrodeposited, 5000 lb lots..... 37.50
- OFHC anodes, 3 in. diam. (5000 lb) 42.50

Brass, 80-20, ball anodes, 2000 lb or more 51.50

Zinc, ball anodes, 2000 lb lots 18.25
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.05
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.60

Tin, ball anodes $1.26 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum, N. Y.. 65.90

Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45

Nickel sulfate, 5000 lbs 31.00

Nickel chloride, freight allowed, 100 lb 47.50

Sodium cyanide, domestic, del'd east of Rockies, 200 lb drums.... 25.80

Zinc cyanide, 100 lb, N. Y. 61.50

Potassium cyanide, 100 lb drum Chicago, del'd east of Rockies... 46.50

Chromic acid, flake type, 10,000 lb or more, N. Y. 30.94

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots	25.75
Carbonyl Iron (200 lb lots)	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25

Copper Powders

Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	44.3 to 62.3
Reduced	15.00†
Chemically Precipitated	45.5
Brass, 5000-lb lots	35.2 to 44.2
Bronze, 5000-lb lots	51.6 to 57.0
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic ...	$1.00
Molybdenum	$3.60 to $4.35
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots..	56.1 to 68.1
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	15.00†
Titanium, 99.25 + pct, per lb. f.o.b.	$11.25
Tungsten, carbide grades...	$3.25
Zinc	20.0 to 28.0

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	....	9.875	....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	....	12.475	....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	....	....
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	....	....	....	37.50
	304	28.80	31.55	34.30	39.75
	316	42.20	46.25	50.25	58.25
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	....
	410	22.70	24.85	27.00	....
	430	23.45	25.65	27.90	....

CR Strip (S9) Copper, 10 pct, 2 sides, $13.85; 1 side, $26.60.

(Effective Dec. 11, 1961)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	133.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O.	163.00-168.00
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md.	$620.00
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore	$715.00
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅝ to ½-in. grains

Per net ton

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
8	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
Ohio Seamless Tube	3	12	62.62	73.40	55.59
Div., Copperweld	3½	11	73.11	85.70	65.84
Steel Co.*	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.

CORROSION? WEAR?

End pump problems with ADVANCED

DEMING CENTRIFUGALS

Deming End Suction Centrifugal Pump. 1" to 6" discharge size. 10 G.P.M. to 2400 G.P.M. Heads to 240 feet. ¼ H.P. to 25 H.P. Most sizes right or left hand rotation.

Deming advance design features show you why Deming Pumps handle toughest jobs with ease—

■ Liquid ends range from tough cast iron to special corrosion-resistant alloys.

■ 4-piece liquid ends get rigid, leak-stopping support — from ruggedly designed power end and 2-ball bearing suspension.

■ You can regulate capacity and head—because of Deming axial adjustment.

■ A Deming is the simplest to service.

Send your problem to Deming—"Pump Information Headquarters."

DEMING
DIVISION CRANE CO.
1271 Broadway • Salem, Ohio

Write for *Bulletin 4011-E*

DYKEM STEEL BLUE®

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2303G North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME

END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2303G NORTH 11TH ST., ST. LOUIS 6, MO.

GOSS and DE LEEUW

MULTIPLE SPINDLE
CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

WHEN THIS LIMIT STOP SAYS

STOP the Hook Block STOPS!

Safe

No danger of overhoisting disasters (particularly damage to the trolley frame or hoisting mechanism) when it's EUCLID.

Simple

Tripping and reset weights do the job. Positive trigger action is assured when it's EUCLID.

Sure

Because this Crane Power Safety Limit Stop is EUCLID designed, tested, engineered and field proved.

For more information about this heavy-duty, smaller in size, lighter in weight Limit Stop, ask for Bulletin 2130.

We specialize in designing the control system best suited to your individual needs. Our services are yours for the asking. **CUSTOM ENGINEERING IS OUR BUSINESS. WHAT'S YOUR PROBLEM?**

EX-29

The EUCLID Electric & Mfg. Co.
Dept. C • MADISON, OHIO

ELECTRICAL POWER EQUIPMENT

MOTOR GENERATOR SETS

KW	MAKE	A.C.V.	D.C.V.
1750	G. E.	4160/2300	250/300
1250	West.	4160/2300	250
1000	West.	4160/2300	250
750	G. E.	4160/2300	250
600	G. E. (3 unit)	2300/440	125/250
500	G. E.	2300	250
400	Al.-Ch.	2300/440	125/250
200	G. E.	2300	250
150	West.	440	250

D. C. MOTORS

HP	RPM	MAKE	VOLTS	TYPE
1500	300	West.	250	TEFV
850	250/500	West.	250	QM
600	250/500	G. E.	600	DBL. ARM
500	210	G. E.	250	MCF
400	1150	REL.	250	T-1970
400	300/900	G.M. (2)	250	DMD
300	575/1150	West.	250	CB-509
200	700	West.	250	SK-201
150	380/1000	G. E.	250	MCF
150	1150	G. E. (2)	250	RC-37

SQUIRREL CAGE MOTORS

HP	RPM	MAKE	VOLTS	TYPE
1500	1800	Al.-Ch.	2300	Ventilated
1250	3600	Al.-Ch.	4000	DP/PF
800	600	West.	2300	CS-44
500	1800	G. E.	2300	KT-565Y
500	1200	G. E.	2300	FT-567
350	1200	West.	440	CS-3255-6H

SLIP RING MOTORS

HP	RPM	MAKE	VOLTS	TYPE
2500	257	G. E.	6600	MT-28
1000	1200	Al.-Ch.	4000	ANY
1000	900	Al.-Ch	2300	ANY
700	720	G. E.	440	I.M.
600	1800	G. E.	4160	M-6345
500	1200	G. E.	440	M-6345Z
400	1200	West.	2300	CW
400	720	G. E.	440	MT-573Y
350	1800	Al.-Ch.	2300	ARYW
300	900	G. E.	440	IM-17

Write for current complete stock lists on electrical power equipment you need or send your list of surplus and used equipment for our offer.

50 YEARS 1910-1960 SERVICE TO INDUSTRY

Phone CAnal 6-2900

CHICAGO Electric Co.

1335 CERMAK RD. • CHICAGO 8, ILL.

4400 KW RECTIFIERS
consisting of:
4—1100 KW Allis Chalmers
MERCURY ARC RECTIFIERS

Electrical Characteristics

INPUT: 2—4400 KVA TRANSFORMERS
Primary: 33,000 V. 4160 V. 2300 V.
Secondary 275 to 86 V. with 34 Variable Taps—Changed under load
4—1320 KVA 3 phase TRANSFORMERS
Primary 4160 V. Delta; Secondary 277 V. to Neutral with INTERPHASE REACTORS
DC OUTPUT—4000 Ampor Multiple
4400 KW 86 to 275 V. or
2200 KW 172-550 V.

- Can be used in Multiples to Suit Requirements
- Controls & Transformers can be Purchased without Rectifiers

HEAT & POWER CO., INC.
60 E. 42 St., N.Y. 17 Murray Hill 7-5280

FOR SALE

1 ton x 11'8" Shaw-Box 1946 DC
3 ton x 19'9" Shepard-Niles 1943 DC
5 ton x 45'0" Shepard-Niles AC 1945 Floor Op.
5 ton x 43'0" P&H DC 1941
10 ton Cantilever crane 35'0" span 1943 AC
10 ton x 28'0" Shaw-Box 1941 DC
10 ton x 45'0" Bedford 1941 DC
10 ton x 48'6" P&H 1942 AC
10 ton x 62'0" P&H 1942 DC HD
10 ton x 75'0 Northern 1925 AC
15 ton x 79'11½" P&H 1942 DC HD
20 ton 28'10" Shaw-Box DC 1946 DC
25 ton x 99'0" Leonard Burke 1943 AC
30 + 5 ton x 60'0" P&H 1942 AC FO

Ornitz Equipment Corp.
Industrial Engineering Service
595 Bergen St. Brooklyn 38, N. Y.
NEvins 8-3566

Used Machines Help Company Prosper

Cleveland enterprise started in February owes part of its success to used machinery.

Roll forming mill is backbone of one steadily developing market.

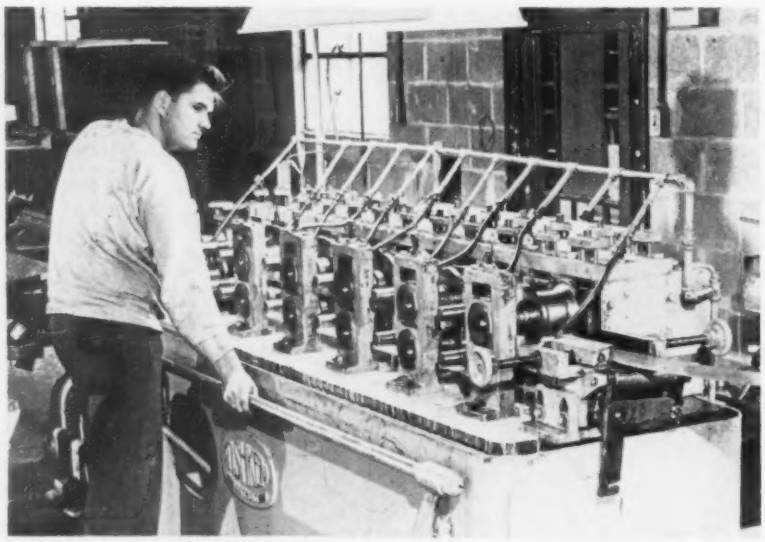
■ Ingenuity and good used machinery have combined to make an industrial success story of one infant Cleveland enterprise.

American Roll Form Products Corp. was started in February of this year by a tube salesman, James Tavenner, and a veteran roll forming and tooling superintendent, George Hascher. Basic equipment is a 10-year-old Tishken roll forming mill plus welding equipment, a lift truck and handling equipment. The mill was first beefed up by Mr. Hascher to handle heavier gauge, wider strip and more intricate shapes. Then they started business early this Spring.

Used Machinery Boost—"We expect that our second six months sales will easily quadruple the first six months," says Mr. Tavenner. "And advance indications are that next year should double this year. We have already ordered our second roll former, another good used machine larger than this one. We never could have gotten off the ground without good used machinery like this."

One product going well for the infant firm is pre-coated material which the roll former has been adapted to form without a mar or scratch. This enables customers to reduce in-plant costs, eliminate painting and its allied headaches.

American Roll Form sells principally to original equipment manufacturers turning out toys, auto parts, building products and housewares. Products include channels, angles, lock-joint tubing and special roll-formed shapes.



OLD HELPS NEW: This 10-year-old Tishken roll former helped put infant American Roll Form Products Corp. in business early this year.

LIQUIDATION PLATE ROLLING MILL

Mill Facility, Equipment and Material of the former Phoenix Steel Corp. Plant located at Harrisburg, Penna.

LOCOMOTIVES

(1) 20 Ton Plymouth Diesel 36" Ga. Cummins

(1) 20 Ton Plymouth Gasoline 36" Ga. LeRoi

MILL DRIVE

(1) 3,000 HP General Electric Slip Ring Motor, 2,300 Volt, 60 Cy., 3 PH., 356 RPM with Comp. panel, and lub. system, air wash sys.

ELECTRIC ARC MELTING FURNACE

HEROULT Model 15 Electric Arc Melting Furnace. Shell Diameter 14'-0"; Inside Diameter 12'-0" Side Charge. Cold scrap charge 30,000#/40,000#. Electrode size 14" diameter x 60" long. Transformer General Electric 6,000 KVA Primary Voltage 13,200/26,400 Sec. 265/92 volts; built in reactor. GE Automatic Control Panel. Westinghouse tot. encl. drawout switch-gear. With approx. 160 spare electrodes and nipples, door frames, rings, motors, etc. S/N 236 Mfd. Heroult Div. U. S. Steel Corp.

TRANSFORMERS

(1) 7,500 KVA Wstghse. 66,000 Pri. 13,800 Sec 3 PH 60 S/N 4089566 Yr. 1948.

(3) 2,000 KVA GE 13,200/26,400 Pri. 2,400/4,150Y, Sec. 1 PH 60 S/SN 2871432; 2871433; 287140.

(3) 667 KVA GE 2,300/4,000Y Pri 460 Sec. 1 PH 60 S/N 4497213; 4497214; 4497215.

ROLLING MILL EQUIPMENT
SLAB EDGER MILL

(1) Slab Edger Mill, Pittsburgh Engr. Co. S/N 48147 (New 1949). Capacity 72" x 18" thick slab, Roll Size (2) 43" Diameter x 24" Working Surface—Alloy Steel. Motor Drive 1,000 HP & reduction gear. Complete with starter, Controls, Etc. (1) MG Set, General Electric 1,000 KW, Generator-600 V DC 1667 Amperes. Motor — 1,400 HP 2300/3/60.

(1) Birdsboro 28" Blooming and Slabbing Mill, 72" Wide, 2 High, Reversing, 28" x 60" Ingot. Minimum Thickness 2". Maximum Lift 28". Maximum Ingot weight 30,000#, (Approx.). Approach Table 38' Long. Run-out Table 26' Long. Both Tables Motor Driven 50 HP 230 V DC.

(1) Hydraulic Slab Shear. Pittsburgh Engr. Co., S/N 48148, New 1949; Capacity 1000 Tons, 6" Thick x 60" Wide Steel Slab (Hot); Hydraulic Pump, 8 Stage Bingham. 500 gpm @ 1,440 psi. Motor Drive—600 HP 2,300/3/60, Starters, Controls, Etc.

(2) Plate Levellers, 6 Upper and 5 Lower Work Rolls, Motor Drive—55 HP 230 V DC.

(1) Birdsboro 42" Universal Plate Rolling Mill, 2 High, Reversing. Maximum Lift 26". Maximum Width 42". Minimum Width 7". Minimum Thickness 1/4". Maximum Weight 14,000# Ingot (Approx.). Vertical Side Rolls each side of Mill Housings for Rolling Plate Width. Front Mill Table 45' Long.

OVERHEAD TRAVELLING CRANES

(1)	150 Ton 40 Ton Morgan	Ladle Crane 59'-6" Spna
(2)	205 Ton Shaw Box	65'-0" Span
(1)	20 Ton Milwaukee Crane (1949)	46'-10" Span
(2)	15 Ton Morgan	64'-6" Span
(1)	10 Ton Alliance	70'-0" Span
(1)	10 Ton Shaw Box	64'-6" Span
(1)	10 Ton Milwaukee	65'-0" Span
(1)	10 Ton Alliance	60'-0" Span
(4)	10 Ton Alliance	56'-6" Span
(1)	5 Ton Alliance	64'-6" Span
(2)	5 Ton Alliance	61'-6" Span
(1)	5 Ton Northern	44'-6" Span
(1)	5 Ton Alliance	40'-4 1/2" Span
(1)	5 Ton Phoenix Stl.	35'-0" Span
(1)	15 Ton Milwaukee Bridge Only (1949)	70'-0" Span

Spare trolleys, 5 ton, 10 ton, 15 ton; contactor panels; cab controls; Resistance banks.

METALLURGICAL HOT BLAST CUPOLA

Rated 15/20 tons hr. Shell dia. 8'-11"; hearth dia. 7'-0"; stack height 40' (12) water cooled tuyeres 3.81" dia. Heat exchanger for preheating 12,000 CFM to 9601/1000°F, with Allis Chalmers blowers, motors, controls. Charging equipment, cyclone dust collector, piping, valves, operating and control instrumentation. Installed 1954.

HYDRAULIC PUMP EQUIPMENT

(1) 1500 PSI Pump (Worthington). Size 4 7/8" x 24", Cap 500 GPM, 1941. 1500 PSI. Duplex Reciprocating Drive—GE 700 HP Synchronous Motor, 2200 Volts.

(1) 1500 PSI Pump (Clearing), 1944. Size 6 3/16" Bore HT-250, Cap 250 GFM. 1500 PSI. Type Triplex Horizontal Plunger. Drive—250 HP Induction Motor, 440 volts.

Accessories (1) 34" OD 27' 6" High 1 12/16" Thick Pneumatic-Hydraulic Accumulator Bottle. ASME, Penna. Std. with Automatic Water Level Control.

(1) 8' OD x 12' Storage and Return Flow Tank.

The Above Units are Equipped with Unloading Valves, Relief Valves, Connecting Piping, Etc.

FOR DESCALING, PRESS OPERATION, PIPE EXPANDING, TESTING, ETC.

CAR BOTTOM ANNEALING FURNACE

MANUFACTURER Tate-Jones & Co., 1941

CAR SIZE 13' wide x 25' long

DIMENSIONS Furnace 14'-1" inside width x 24' inside length; Door Opening 13'-4" wide x 9' high at center of arch, 7'-6" high at end of arch. Overall 29'-3" long x 17'-8 1/2" wide x 17' high

COMBUSTION AIR Robinson Type CS 2100 CFM @ 16 oz., 15 HP 220/440/3/60

TEMPERATURE CONTROLS (1) Brown Potentiometer Pyrometer, 0-2400°F

TEMPERATURE CONTROLS (1) Brown Potentiometer Pyrometer, 0-2000°F

CAR Mounted on (5) pairs of 15" diameter chilled cast iron wheels, Timken bearings

CAR PULLER Link-Belt Chain Type SS-111 used to haul car in and out of furnace (installed under the floor in a shielded trench)

BURNERS (14) Tate-Jones & Co. #L-75 with North American Ratiotrols

DOOR HOIST Yale Electric Hoist, 1/2 Ton

This furnace is complete with all necessary motor and combustion controls, valves, meters, strainers, piping, etc., required for the operation of this unit. There is optionally available a 10,000 gallon oil storage tank used for supplying No. 2 fuel to this furnace.

EDGE TRIMMING AND SLITTING SHEAR

Capacity 96" wide x 7/16" thick plate. Arbor 12" diameter, circular cutters 16" diameter x 2 3/8" face. Cutting speed adjust to 62 fpm Drives 65 HP, 250/1,000 RPM, 230 volt. DC., with operator's pulpit, controls, etc. Mfd. by Monarch Tool & Die Co., Milwaukee, 1949. Approx. wt. 80,000#.

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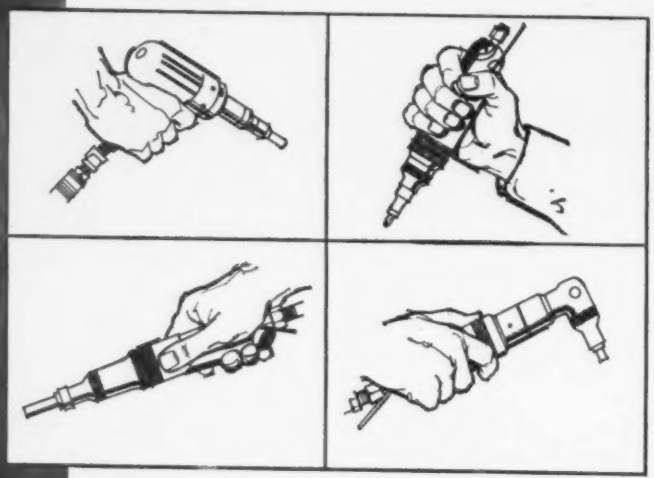

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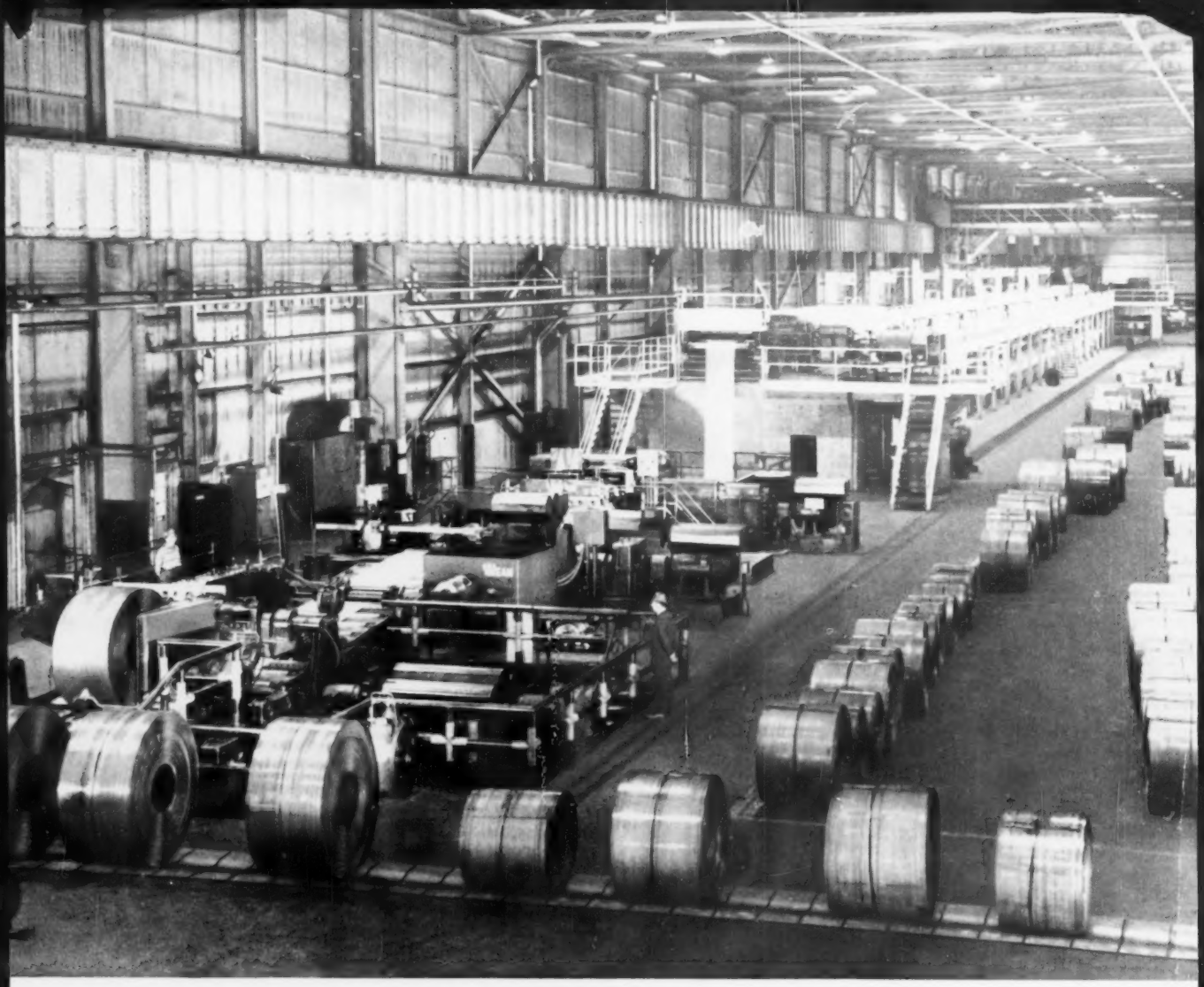

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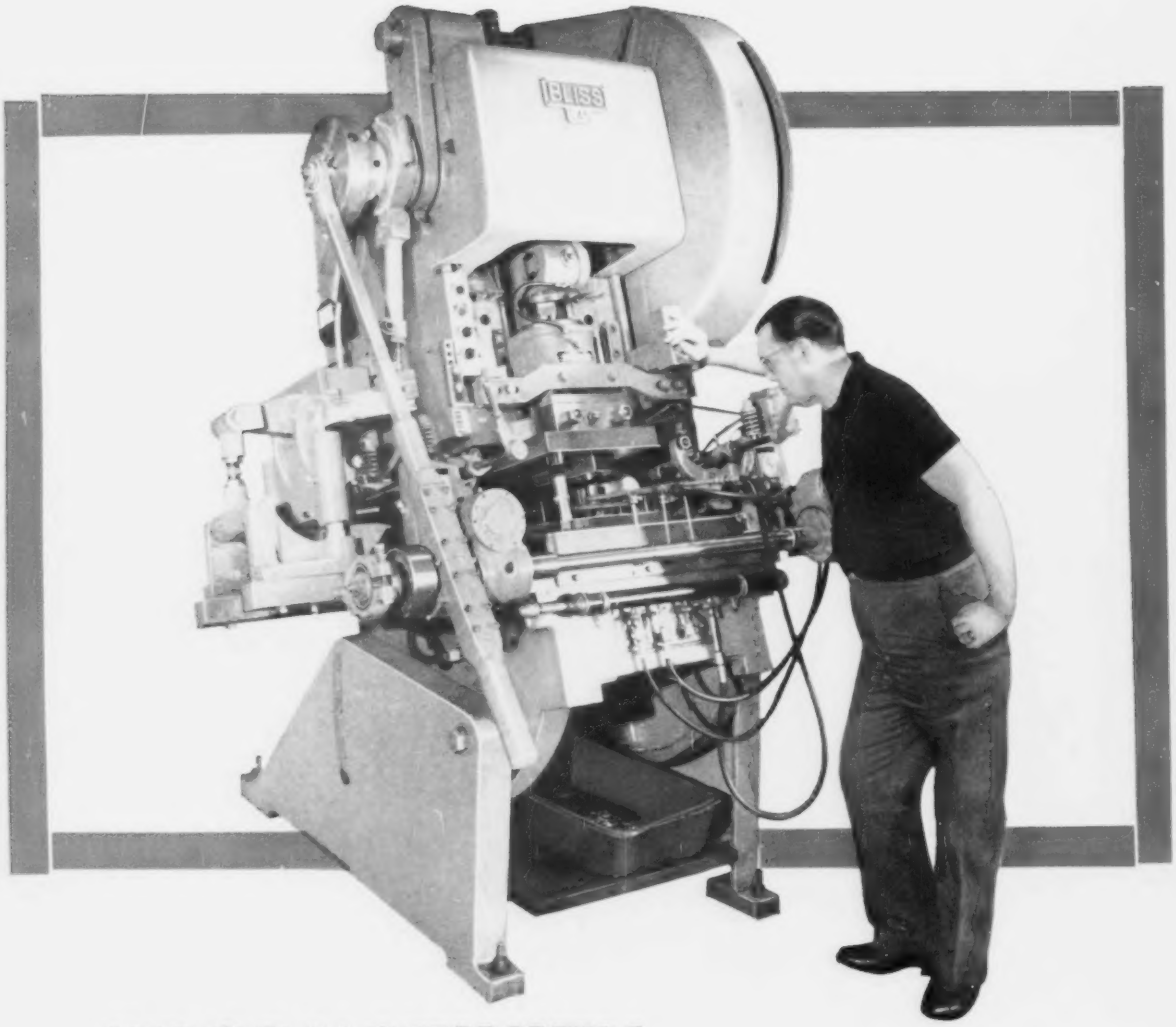

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